JOURNAL

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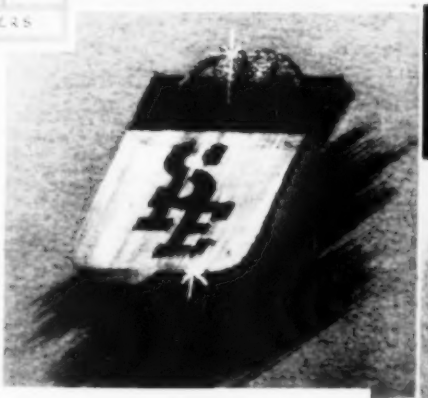

SEE PAGE TEN

PUBLISHED BY THE SOCIETY OF PLASTICS ENGINEERS, INC.

They've Steered NEWARK DIE to World Leadership in Mold Making

G. J. SCHUSTER

Superintendent, Heavy Moldmaking Division

Experience: tool and die making—32 years; in plastics industry—29 years; with Newark Die—29 years. Training: Fawcett Technical School.

E. W. SPITZIG

Superintendent, Hobs and Hobbing Division

Experience: tool and die making—39 years; in plastics industry—25 years; with Newark Die—25 years. Training: Newark Tech.

W. W. GRYCE

Manager, Sales and Application Engineering

Experience: design engineering—20 years; in plastics industry—16 years; with Newark Die—4 years. Training: Rutgers University.

W. J. TRAUTWEILER

Superintendent, Light Moldmaking Division

Experience: tool and die making—23 years; in plastics industry—15 years; with Newark Die—15 years. Training: Newark Tech.

M. G. WOHLLEBEN

Chief Designer

Experience: in tool and die making—26 years; in plastics industry—16 years; with Newark Die—16 years. Training: Stuttgart Technical School.

HARRY TAYLOR

Chief Estimator

Experience: with Newark Die—20 years; in plastics industry—20 years. Training: Newark School of Fine & Industrial Arts.

ISLYN THOMAS

General Manager

Currently National President of the Society of Plastics Engineers, Mr. Thomas is the author of numerous technical articles on mold design, hobbing and mold-making as well as the standard textbook, "Injection Molding of Plastics." He is one of the country's foremost authorities on plastics engineering.

ROLAND FRACKENPOHL

Plant Manager

Associated with Newark Die for 28 years, Mr. Frackenpohl has been active in the tool and die making industry since 1915. His early developmental work on mold-making is responsible for many of today's standard techniques.

IT'S just half the story to say that Newark Die is the world's **largest** plastic mold-making plant, or that its specialized facilities for the production of hobs, hobbed cavities and machined molds are unmatched elsewhere.

Behind that achievement are the pooled experience and professional skill of these master technicians. Experts in all phases of tool and mold design, they control the operation of Newark's batteries of giant hobbing presses, die-sinking machines, lathes, duplicators, grinders, engraving machines and heat treating equipment.

This unique combination of top-flight personnel and superb equipment explains why Newark Die is renowned for its ability to turn out close-tolerance, high-production molds **on time** and at surprisingly **low** cost. Good reasons, too, why it pays to check **first** with Newark on your mold-making requirements.

NEWARK DIE COMPANY | 22 SCOTT STREET, NEWARK, NEW JERSEY

JOURNAL

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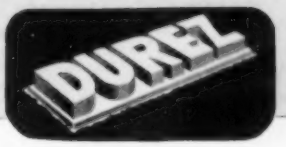
PROFIT HAS MANY FORMS
when the material is

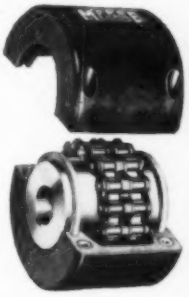


BEVEL GEAR TEETH TEST ACCURATE

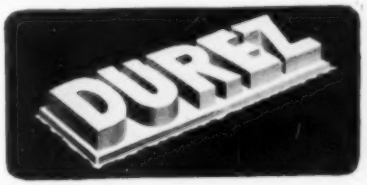
It takes a plastic of uniform molding qualities to make bevel gears that check okay on this angular tester. This is one reason why Durez high-impact phenolic is used for gears that drive reels through 8 treatments in modern continuous rayon spinning. Molded gears require but a single tapping operation, laminated ones used previously required hobbing plus a machined metal insert. Durez has a smooth natural finish. Its chemical inertness permits use in installations where corrosive agents are present.

FLEXIBLE CHAIN COVER
resists acids, alkalies, corrosion

Many services expose chain drive coupling covers to these hazards that shorten the life of metal covers. For such services, a leading concern meets its customers' needs with grit-proof and dust-proof split housings molded of rag-filled Durez phenolic plastic. The plastic covers provide sealed-in lubrication and maximum protection for the life of the coupling, when used with suitable lubricants. They are compact, strong, and easy to assemble, and they add to the good appearance of the equipment. Bosses and recesses, including tapered grooves for oil seals, are formed in the mold.



FOR MOLDERS DESIRING APPROVAL under MIL-P-14A, Durez is producing compounds having mechanical, electrical, and chemical characteristics in many popular combinations. Durez field technicians can help you, too, in applying molding compounds or resins to your processes. To keep informed on new uses of phenolics, write (on your letterhead, please) for our monthly Plastics News. Durez Plastics & Chemicals, Inc., 1111 Walck Road, N. Tonawanda, N. Y.



Phenolic Plastics that fit the job

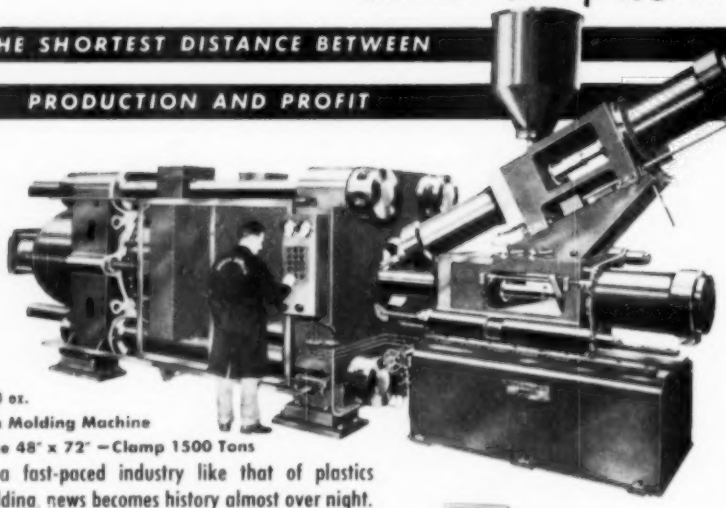
BEHIND The Story of PLASTICS MOLDING...

STANDS THE

W-S "Completeline"

THE SHORTEST DISTANCE BETWEEN

PRODUCTION AND PROFIT



W-S 300 oz.
Injection Molding Machine
Die space 48" x 72" — Clamp 1500 Tons

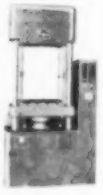
In a fast-paced industry like that of plastics molding, news becomes history almost over night. Only a few years ago, W-S was pioneering the "big" injection machines—eight, then 12, then a fabulous 16 ounces! Now, Watson-Stillman's high-speed production giants—the size of small locomotives—shoot almost 20 pounds per cycle.

Yes, plastics molding has come of age. What started only yesterday as a manufacturing business has become a major industry . . . its applications tested and proved . . . its markets huge and growing . . . its materials and products pronounced "critical" in the most vital fields of civilian and defense production.

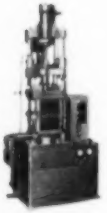
W-S is proud of its right to claim an associate editorship in the "writing" of this typically American success story — the encyclopedia of plastics molding. We have worked closely with its chief editor—the molder himself—in developing the most complete line of production machinery anywhere available.

Always reflecting, and frequently anticipating the molders' needs, W-S has developed machinery ranging from one to 300 ounces capacity, and including complete installations for every material and method commercially employed in molding by compression, transfer, and injection techniques.

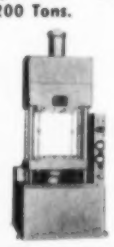
This kind of close association with the beginning, development, and assured future of the industry makes W-S more than ever your logical first-choice consultant on your present expansion or new-plant planning.



Compression Molding Presses — 50 to 1200 Tons.



2 Ounce Semi-Automatic Injection Molding Machines.



Transfer Molding Machines—30 to 1200 Tons.

Vertical Injection Molding Machines—1, 2, 4, and 6 ounces.

Preform Tableting Machines—10 and 100 Tons.

9-L-31

HYDRAULIC MACHINERY DIVISION

WATSON-STILLMAN

Established 1848

Main Office, 153 Aldene Rd., Roselle, New Jersey

Manufactured in Canada by—Canadian Vickers, Ltd., Montreal

Foreign Sales Representatives: OMNI PRODUCTS CORP.
460 Fourth Avenue, New York 16, N. Y.

Golden Gate Talk On Tumble-Finishing

By RICHARD WEBER

Resuming the monthly meetings after the summer vacations, the Golden Gate Section of the Society met at the El Jardin Restaurant on October 26th.

The meeting was called to order at 6:40, Joseph Smith, Local Pres. presiding. The attendance was twenty-two.

Mr. Richard Barnes of the Tumblematic Co. gave a very interesting talk on the "Tumble Finishing of Plastics and Related Metal Parts." Mr. Barnes had many samples to show as well as examples of the many carriers and materials used in the finishing processes. After the address a spirited questions period added interest to the talk.

John Robb announced the invitation to our local of a tour through the Owens-Corning Fiberglass Plant. Members wishing to take advantage of this splendid opportunity were told to contact the secretary.

Two visiting plastics men requested application blanks with the view of becoming members.

The Affairs Committee was instructed by our president to meet soon to begin making arrangements for the Annual Christmas Party.

Buffalo Meeting

The Norton Room of the Park Lane Restaurant was the scene of the Buffalo SPE Section meeting on October 19. The social hour at 6:30 p.m. was followed by a dinner at seven o'clock and the meeting at eight. A talk and demonstration of the application of decorative plastic coating to various materials and objects was presented by the Di-Noc Corp. of Cleveland. A report was given by Hi Nathan on the National Directors' Meeting, held in Washington on October 17.

Upper Midwest

The SPE Board of Directors' monthly meeting was held on October 15 at Esslingers Cafe, 1927 University Avenue, St. Paul. An address, "A Study of Injection Molding Cycle," was given by G. D. Gilmore, Plastics Technical Service, The Dow Chemical Co. Movies accompanied his speech, showing what actually happens within the mold as pictured through a glass mold. Slides showed flow at various stages under various conditions. Mr. Gilmore is a graduate of Michigan State Mechanical Engineering School and worked for Pratt and Whitney before entering the service.

Plans for Conference Near Completion

"PLASTICS HORIZONS" IS THEME OF MEETING JANUARY 16-18.

8TH SPE CONFERENCE PLANS NEAR COMPLETION

Headquarters for the Eighth Annual Technical Conference of SPE will be the Edgewater Beach Hotel in Chicago. Situated away from the downtown area, it is well-known as a convention site.

Conference arrangements will differ in some ways from previous years; the papers will be given starting at 2 p.m. Wednesday, instead of in the morning. This should prevent the registration process from interfering with early attendance. Also, the National Council will meet and elect officers in the morning, so that the Councilmen will have a chance to get around during the Conference instead of being tied up in Council meetings.

Banquet tickets for Thursday night, and Luncheon tickets for Friday noon should be purchased at time of registering, or with your **advance** registration.

Individual advance registration information is being sent out by the National Officer to all S.P.E. members. Non-members should contact Bess Day, 409 Security Bank Bldg., Athens, Ohio, for advance registration information.

Partial list of speakers readied for "Plastics Horizons" theme in Chicago, January 16-18

Tentative plans for the program for the Eighth Annual National Technical Conference of the Society of Plastics Engineers, Inc., have been announced as follows:

Dr. Johan Bjorksten, Bjorksten Research Laboratories, "Plastical Archeology."

E. C. Blackard, Tennessee Eastman Corp., "Extrusion of Large Piping".

Robert Burns, Bell Research Laboratory, "ASTM Standards and Their Effect on Plastics Technology".

Dr. Wyman Goss, General Electric, "Modified Phenolics".

Gordon Thayer, Dow Chemical, "Molding of Thick Sections".

A. J. Wiltshire, Apex Elec. Mfg., Chairman of Panel on "Reinforced Plastics".

Representative from Hydraulic Press Manufacturing Co., "Preplasticers".

Carl F. Massopust, General American Transportation Corp., Chairman of Panel on "Mold Design".

Dr. Paul Elliott, Naugatuck Chemical Division of U. S. Rubber, "Impact Styrenes and Copolymers".

Jean Reinecke, Chairman of Panel on "New Applications and Design Problems".

Dr. G. F. D'Alelio, Vice-Pres. & Director of Research, Koppers Co., Inc., subject to be announced.

A. M. Stover, Naugatuck Chemical Division of U. S. Rubber, "Extrusion of Vinyl Film".

Corliss Cummins, Dow Chemical Co., and Edward Kennedy, Monsanto Chemical Co., "The Engineer's Part in Sales."

Reading of papers from the Prize Paper Contest.

An outstanding and unusual feature of the conference will be a symposium on Military Applications, to be led by Mr. Ken Gossett of Gossett & Hill.

Any company wishing to have official representation at the conference should contact the Chairman of Company Registration, Robert S. Stephens, Sobenite, Inc., 7720 North Sheridan, Chicago, Illinois.

Society of Plastics Engineers
Athens, Ohio

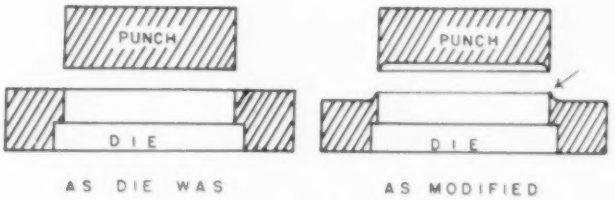
Gentlemen:

We had a die in our shop that was made to cut extruded plastic strip. It was made like a regular blanking die and did a rather poor job and was unacceptable to the customer.

When we were asked what could be done to improve the product of the die we frankly admitted that we did not know. We inquired around among toolmakers, die makers and the material suppliers. Other than suggesting that we try it with the strips hot and another with the strips cold they had little to offer.

We had tried the die with the material heated without success so we got some dry ice and tried it cold. The end result was just about the same.

We then tried an experiment and the die worked much better, at least our customer got an acceptable product from it. We had never heard of such a die and it is possibly novel so a sketch and sample runs are sent you. Doubtless others have had or will have such a problem and the idea may help.



AS DIE WAS AS MODIFIED

(For Simplicity, Stripper and Other Parts Not Shown)

Of course the pieces should have been injection molded but that is the responsibility of someone before we entered the picture.

Thousands of pieces have been run off the die and it seems to have no wear as yet.

THE *Injection* MOLDERSCOPE

By A. R. Morse
President, Injection Molder's Supply Co.

The cause of mica marks in styrene and how to avoid them, and the probable future of dry coloring.

Mica Marks in Styrene

Many an injection molder tries to remove the cause of mica marks from styrene parts by drying the material before molding. Or "Moisture in the color," one molder will say of a dry color batch. "Bad batch of material," says another. Unfortunately they are usually wrong. Mica marks, or silver streaks or flakes, or whatever you wish to call these surface defects often found in styrene parts are almost always due to what we can only call sizzling the material (like a steak sizzles in a pan) by exposing it to too hot a heater surface during melting. (The same condition can occur in acetate molding, and from the same cause if it is NOT attributable to moisture.)

There are only two remedies and a makeshift. The first remedy (often economically undesirable or impossible) is to slow the cycle down and lower the molding heat. The second is to get a newer, more efficient heating cylinder of larger capacity to melt the same amount of material safely and at a lower heat, but at the same cycle. And the makeshift is to use a heated pineapple type mixing nozzle to mix up the degraded material, to temper it, and to try to cover up the fact that the heater is being worked over its actual capacity for safe melting.

Extra capacity heating cylinders are now available for most existing machines, and will do more to reduce mica marks than any adjustments that can be made under production conditions. This trouble is cropping up more and more because injection molders will persist in trying to operate their machines at or near rated capacities. Rated capacities mean very little these days: some are in acetate, some are in styrene, some sheer guesswork it would seem. When a machine is overworked in the pounds per hour it can SAFELY melt, regardless of its rating in ounces or the claims made for it, mica marks will appear and run up your scrap.

Hot Blending of Dry Colors

Will dry coloring drop in importance if the material people get the price and delivery of colored stock whipped into line? I doubt it. The inventory problem alone, except in the case of very large users, will always make dry coloring attractive. Look for a low cost, hot blender soon. If the granules are melted once with the coloring agent, and the resulting mix reground, results are 100% better than if you merely tumble and mold. This hot blender will not be a fancy, twin screw high pressure, vented, precision extruder, but just a simple low cost tool of the screw type to hot mix and melt the dry color blend into ribbons which are cooled, ground, and fed into the injection machine as colored granules. Capacity and price figures are not yet published but the unit will (should) run under $5000, and push over 150# per hour. Seems as though the action of the screw is essential to do a good job of hot blending. A machine like this will do a good deal to eliminate some of the problems still hounding dry coloring (mostly streaking and contamination). And a low cost hot blending setup for the average shop will clinch the future of dry coloring in the injection field once and for all. It is here to stay in spite of recent doubts—trouble with cleaning general purpose fixed barrel tumblers, contamination, dirt, part streaking, lack of opacity and other difficulties with the process that keep creeping into even the best run shops. Most difficulties with dry coloring are readily eliminated by using special purpose tumblers and nozzles that are designed just for dry color work in the injection shop, and by using heat-fast colors developed exclusively for the high heats of the injection process. Dry coloring is not, however, a process that the management can take for granted and forget about it once it is installed, or costs will start to climb. Eternal vigilance is the price the injection molder must pay for the convenience of being able to color his own stock. A low cost hot blending setup will definitely eliminate many of the present headaches with the process, and bring the results almost parallel with factory colored stocks.

Plastics Horizons
SPE EIGHTH
TECHNICAL CONFERENCE
CHICAGO JAN. 16-18

BERYLLIUM-COPPER CLEVELAND TOPIC

By DAVID SLOANE

Mr. M. A. Nichols, President of the Manco Products Inc. spoke on the subject "Why Beryllium Copper" at the October 8 meeting of the Cleveland-Akron Section. Mr. Nichols described in detail the origin of beryllium, the alloying of beryllium copper, the physical properties of these alloys and finally, the application of beryllium copper to injection mold cavities.

Using an air-hardened steel hob Rockwell C-55 to 58, large numbers of beryllium cavities can be made by means of hot hobbing with the steel master. Using this method and a shrinkage factor of .004 to the inch, accurate and identical cavities can be made with very great fidelity of detail. Lacking a steel hob, it is possible to take a wood or plastic pattern, cast a beryllium copper hob and then in turn make multiple cavities from this hob. The shrinkage factor naturally is changed when this process is used. The beryllium copper cavities can be hardened to Rockwell C-45 in which condition their strength is very great and Mr. Nichols reported instances where several million parts were made from the cavity without the necessity of replacing it. The maximum size noted by Mr. Nichols for any cavity is approximately 15" x 15".

Other advantages were the high rate of heat conductivity which would permit faster cycling and the ease of machining beryllium copper in the annealed state.

After the meeting, Mr. Nichols displayed 20 cavities which he had brought with him.

Jack Perloff reported that four technical papers were received for the prize paper contest and the judges would make their decision known at the next meeting.

Wayne Anderson reported that Ward Van Orman has been appointed the Chairman Pro Tem of the 1954 Conference Committee to handle all the correspondence on that subject.

MATERIALS SUPPLY IS TOPIC AT CHICAGO

By TIM SERRELL

At the October meeting Mr. Rau reviewed the plastic material situation and the business outlook for the industry, as presented at the recent 7th annual conference of the New England Section of the

(Continued on Page 18)

SUCCESSFUL DESIGNING FOR PLASTICS MOLDING

By W. M. HALLIDAY

Halliday's series of articles has been a popular feature of the British magazine Plastics for several years. We are happy to bring these articles to you by special arrangement with Plastics.

This is the first of a complete series of articles dealing with all design aspects arising in the development of suitable component forms, economical mold design and construction, and the determination of the appropriate molding technique.

For the successful and economical manufacture of satisfactory moulded articles, which have to meet specific requirements laid down by the user, as well as conform to the needs and limitations of the moulding process, three chief phases of design will arise. The determination and solution of the various problems connected thereto, generally, are part of the duty of the plastics technician, or mould designer, or of both, in close consultation together, and usually, with the prospective user.

A Threefold Design Problem

These three essential forms of design consideration are: First, those connected with the evolution of the most suitable shape, features, size, material, and general characteristics of the component which has to be moulded.

Secondly, comes the phase comprising the large and vital set of factors associated with the design of the mould for producing such a component. Allied very closely to this second design problem is the one of mould manufacture, and the satisfactory determination of the most convenient, inexpensive, and reliable method of producing the mould with the equipment at the disposal of the mould maker.

Thirdly, there is the whole question or, rather, the set of problems surrounding the determination of the most appropriate moulding technique and procedure to be adopted in the manufacture of the moulded article.

With this question, too, is bound up that of the selection of moulding materials from which the component is to be made, the choice of moulding plant, and general operating procedure and instructions.

Generally it will be found that the solution of these design problems is performed by the mould designer; at any rate he will largely influence, and rightly so, the design characteristics incorporated in the projected component. He will determine all the design features of the mould and the operating moulding technique to be employed.

The component design must be worked out by one who not only possesses an intimate knowledge of the working of the various plastics compounds which are now employed, but also a full understanding of the highly specialized business of mould design and construction; and having, too, some practical acquaintance with the needs, requirements and limiting factors connected with any one of the numerous procedures which may be adopted.

Many potential users of plastics mouldings are often entirely unfamiliar with these vital technical matters, and as a result they are incapacitated to that extent from laying down binding restrictions governing the shape, size, and general design form which may be incorporated in the final moulded article.

Practically every engineering designer will be called upon at some time or another to fashion and design plastics moulded components, either as entirely new and unique articles, or as replacements for some component produced by the more orthodox methods of manufacture.

To derive the fullest advantages inherent in the plastics moulding process it is vitally necessary that the component form be developed by one who understands those needs most fully, that is, in fact, the specialist moulder. To accomplish this in the general run of cases, implies close co-operation between the user and the moulder. The first requirement for establishing such co-operation is, of course, that the user shall be perfectly candid in passing along explanations of the particular service conditions which the component will have to meet, and exactly what functions it has to fulfill.

Shortcomings in respect of the design of a plastics moulded component may arise not only as a result of lack of knowledge of the limitations of the process, but also because of the failures to appreciate toolmaking restrictions in regard to mould manufacture and usage. Alternatively, certain features may be stipulated as important by the user, but which cannot be obtained by the moulder because no single type of moulding material possesses such qualities.

In those cases where it is not absolutely essential for the user to stipulate design forms of one kind or another, it is far better to allow the greatest freedom to the mould technician or designer, so that he may be enabled to adapt, to modify, or even drastically to transform the user's original suggestions respecting design forms. In this way, it is far more easily possible to obtain a correctly designed moulding, capable of meeting more exactly the user's requirements. At the same time it will probably prove less expensive, because numerous objectionable features will be eliminated at the outset. Certainly the whole development of the component design will then be associated with far less worry, problems and snags.

With many plastics moulded articles of intricate configuration much valuable time may be wasted and additional expense incurred by the mould maker attempting to achieve what are in effect really difficult or even downright unsuitable forms. This kind of thing leads obviously to an increase in the final costs for the moulded parts, as well as materially inflating the initial mould charges.

Therefore, the closer the co-operation between user and designer, the greater likelihood there will be of finally obtaining satisfactory mouldings, at lower prices, and with far less worry.

Factors Determining Component Designs

Component design is determined in the last resort by a number of highly important factors, which will now be very briefly enumerated, and more fully explained and discussed in succeeding sections of this series. Four

of these factors only are mentioned at this point:—

(1) Designing the Component to Meet its Service Conditions

The prospective user of a potential projected plastics moulded product will obviously have certain ideas in view. Thus he may wish to obtain a component to replace an article hitherto employed but which has been made in metal, wood, or some other non-plastic material. He may desire a moulded component having great mechanical strength, the ability to withstand shock or wear, high dielectric qualities, or one having improved surface appearance, or economies in costs, and so forth.

In short, it will require the provision of every physical feature which will render the finished moulded article capable of more satisfactorily meeting the particular service conditions to which it will be subjected.

Designing the component form to meet such requirements demands considerable skill, knowledge, and foresight on the part of the plastics moulder. Very many problems will have to be solved in deciding this question to the best advantage.

(2) Designing the Component for Successful Manufacture

The style of component decided upon; the type of plastics mould developed; the material to be used; the features required; and the quantities of mouldings to be produced are the factors largely determining the method of manufacture which can be used. This problem cannot usually be settled in insolation from the foregoing essential factors.

(3) Designing the Component for Material

The shape, size and features required in the component will decide the kind of material which can be employed in its manufacture. To a lesser extent the process of manufacture will also condition the kind of material to be used. In determining this matter the designer will usually have to make a very careful check up of the mechanical and physical properties desired in the finished moulded article, and then select a material which will most closely fulfill such requirements.

It deserves to be mentioned here that generally it will be necessary to determine the type of material at the very outset of the development of the component design. Once the material has been chosen with reliability, the designer may then proceed to work out the detailed component design, its shape, size, forms, etc., making due allowance for shrinkage, and other peculiarities known to be possessed by the particular material selected.

Colour, texture, surface finish, etc., may also condition the selection of material, and incidentally when deciding this question the mould technician should be furnished with exact details of the user's wishes or needs.

(4) Designing the Component for the Mould Design

Very often the component design has to be modified or adapted when the question of mould design is under consideration. Innumerable apparently minor points may be incorporated in the component design, the reproduction of which will raise difficulties during mould manufacture, or later in the operation of the mould. It is far better that such points be settled whilst the mould design is at the drawing-board stage. Once again we revert to the important question of co-operation between user and mould designer!

General Requirements of Component Design

The mould designer has not only to fashion a tool which will reproduce the shape of component required, but has also to design it so that it can be operated economically, and will give uniformly accurate and reliable service for a lengthy period.

Within these broad limits of application, a properly designed plastics moulded component must also be capable of satisfying the following important requirements, if economical and successful manufacture is to be attained:—

(a) The component design must be of a character rendering use of the most simple and economical form of die construction.

(b) The design must also be that which permits the most durable and reliable form of die design.

(c) The component design should be of a character which ensures the most economical utilization of the plastic moulding material to be employed.

(d) The component design must also be such as to lead to the most economical form of moulding procedure.

(e) The design form should also entail the minimum amount of trimming, cleaning, or subsequent machining of the part after moulding.

(f) The component design should be one calling for the least amount of mould maintenance during production.

In the ensuing sections all these points will be considered much more fully and the preferred design principles ascertained as a result of practical experience in the working of plastics will be described and illustrated by actual examples.

Basic Requirements of the Mould

Turning now to the matter of mould designing, a great number of very important considerations again arise for settlement by the mould designer. He will first have to decide the style or type of mould to employ. Now he will have to determine whether to use a single or a multi-impression tool. The question of the manufacture of the mould will then arise, and in particular, in what precise manner the necessary cavity formations are to be provided.

Whilst each mould design is usually something of a special and unique nature, due to particular characteristics of the moulded component, certain common and specific forms and elements will have to be employed in the mould. The set of elements thus used will vary, depending upon whether the mould is intended for use by the compression, injection, transfer or extrusion process of moulding. In later sections of this series numerous

(Continued on page 20)

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HYDRAULIC MAINTENANCE IN INJECTION MOLDING PLANTS

By A. R. MORSE
Injection Molder's Supply Co.
Cleveland, Ohio

Costly down-time can be drastically reduced by proper care of your hydraulic systems. Here's what you can do about it.

Of the some 5 to 8 thousand (estimates by "official" sources vary) injection molding machines in this country, all but a few dozen utilize self-contained hydraulic units. These hydraulic systems all incorporate either vane type or piston type commercial pumps, combined with standard valves. The injection machine, however, is unique in the relatively severe demands it makes on hydraulic equipment and hydraulic oils. As many as 20 times a minute, pressure rises from 0 to 2000 pounds with an abruptness that leads indirectly to many different types of maintenance expense. The rapid frequency of change from low to high pressure in the injection circuit particularly when coupled with the demand for full volume, full pressure by the large injection cylinder, creates hydraulic maintenance problems unparalleled in most other general hydraulic applications. These problems are so much with us, and in many cases have been taken so for granted by the injection molder, that a review of possible preventive measures cannot help but be of some value, even though most injection molders are prone to regard their injection hydraulic systems as "sleeping dogs," and seldom do anything about forestalling this potential cause of costly downtime.

The problem of hydraulic oil and equipment maintenance in the injection industry requires comparatively specialized attention. Many of the general purpose cheaper grade oils, general purpose light duty filters, and other general service materials have proven expensive experiments and only caused more trouble, or met it but halfway. Well meaning recommendations by persons unfamiliar with the injection field have in many cases given the injection molder a poor opinion of any further attempts to reduce his downtime from hydraulic causes.

Records prove that machine downtime in the injection industry is about 50% due to troubles associated with the hydraulic system, about 35% associated with the heating cylinder and 15% with electrical failures of various types.

Formerly, this downtime was divided as to cost, about 80% to the heating cylinder and 15% to hydraulic and 5% to electrical failures. But with recent growth in the number of piston type pumps in use and the clear-cut trend to full hydraulic clamp on large machines, the figures are currently about as follows: 50% of cost of downtime, heating cylinders; 45%, hydraulic maintenance and 5%, electrical.

The relative seriousness, therefore, of hydraulic downtime with piston type as opposed to vane type pumps, of itself, justifies any precautionary measures that can be taken. Rather costly experiences here and there can be summarized for the benefit of those fortunate molders who have not yet heard their "32 oz" grind to a halt, only to find an expensive overhaul that could be definitely have been prevented staring them in the face.

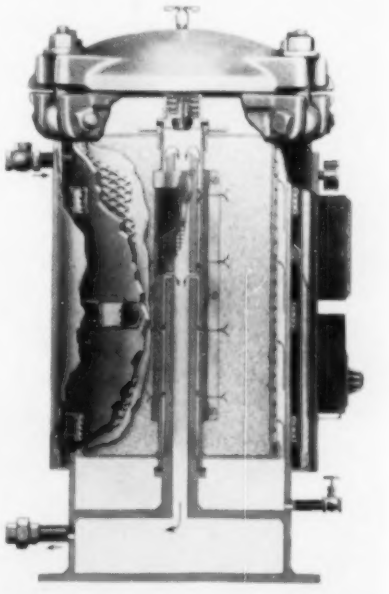
TUBING FAILURES

There are several angles to hydraulic problems faced by the injection molder, and not all are under his control. A considerable variation in tubing specifications by the various equipment manufacturers as actually observed on machines in the field prove that a lack of standardization may be the cause of many of the tubing failures experienced by injection molders.

Many of the engineers concerned with preparing specifications of injection machines have never even been in an injection plant. Generalized recommendations of the tubing people are followed instead of taking cognizance of the unusual severity of the application. The writer has actually seen technical recommendations made by suppliers of hydraulic equipment who were familiar with the injection field over-ridden and discarded by engineers of the equipment manufacturer on purely theoretical grounds.

Nor is tubing a province for executive action it would seem. The writer has stood beside the general manager of an injection equipment concern when we were discussing line breakage on a machine, and seen a tube split almost squirting oil on the official trousers, but even the irate molder could not convince the official that here was a serious problem to be looked into.

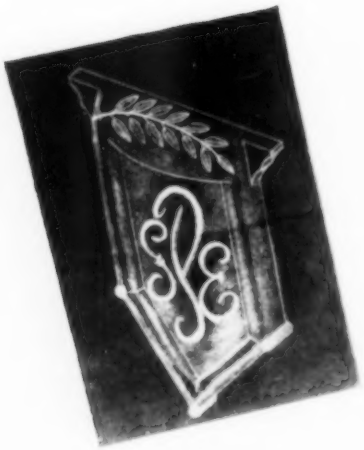
The particularly severe rapid pressure fluctuations typical of the injection circuit make the use of tubing subject to two types of fatigue. Bent sections of tubing (often used to reduce piping assembly costs) repeatedly try to straighten themselves under the quick successive applications of high pressure, making the bends subject to fatigue and failure. The tubing also "works" at the flanges, and crystallization there is likewise a common cause of downtime.



Special explosion proof all-steel hydraulic oil filter designed exclusively for use in the injection molding plant. Cut-away view shows internal relief valve, built-in for safety.

Fortunately, (or unfortunately) if tubing or fittings are going to fail in the typical injection circuit, the chances are better than 5 to 1 that

(Continued on page 12)



THE SPE PI ESI

Which of these designs makes the best lapel pin for SPE?

That is the difficult problem to face the contest judges. An award of $50 for the best design will be presented at the Conference Banquet in Chicago, January 17.

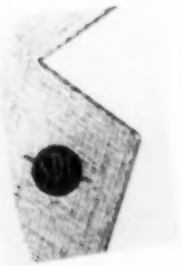
If the best design is considered suitable, it will be used to make the SPE membership lapel pin.

The designs on the cover and these pages, are a part of the total number submitted. They come from all parts of the country, from members and non-members, some as sketches, and some complete with engineering specifications and cost estimates! Entries have been submitted by:

Richard A. Rybak, The R. & K Tool & Die Co., Cleveland, Ohio.

Clyde E. Morrell, American Optical Co., Southbridge, Mass.

Carl Selby, Chicago, Ill.



PESIGN CONTEST

E. C. Tickner, Millburn, N. J.

Robert O. Wood, Scranton, Pa.

C. A. Laughlin, Northwest Plastics, St. Paul, Minn.

H. M. Ferguson, Fort Wayne, Ind.

Harris Sanders, Albany, N. Y.

A. J. Vallieres, American Optical Co., Southbridge, Mass.

Ray Preiss, Holyoke, Mass.

N. M. Roman, East Cleveland, O.

Walter R. Kosy, Chrysler Corp., Detroit, Michigan

Edward H. Roberts, General Electric, Erie, Pa.

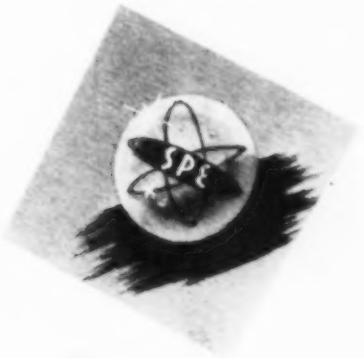
C. Rector, Nat'l. Engineering Products, Washington, D. C.

Charles L. Smith, Athens, Ohio

Edward Landry, Standard Tool Co., Leominster, Mass.

Summers Hinshaw, Fountain City, Tenn.

Eric Kelk, Toronto, Ontario, Canada.



failure will occur again at the same point, or in the same line on the same machine. Such chronic breakage however is hard to spot over a group of machines, as due to differences between presses too complex to discuss in detail here*, failure of a line on one machine does not mean that that line will fail on another identical machine. But once spotted on any given press, the broken line should **NOT** be repaired by simply replacing the pipe or tube, but by one of two methods. Extra heavy duty pipe, carefully cleaned on the inside should be used, or else a piece of flexible hose, proven in the injection field**, should be installed at one end or other of the line to eliminate the shock strain or fatigue that led to the failure of the rigid line. The use of blocks, brackets, supports, etc., to try to prevent movement of the pipe only briefly postpones trouble.

No rule can be made about when to use pipe fittings or when to use flexible tubing in replacing chronic trouble spots in injection machine hydraulic systems, but in general either will end the problem once and for all if properly installed, without strains.

In certain machines where hydraulic pilot line breakage is very severe, the cost of a change to integral solenoids and electric controls can very often be more than offset by downtime thus eliminated.

OVERHEATING

Another common cause of injection machine downtime is due to overheating of the oil. If the oil reaches a temperature over 120°F it can be said to be overheated. This results in excess leakage. It slows the actual cycle down as the oil thins out; and it causes trouble with packing glands thru drying, shrinking and lack of lubrication necessary to the seal. Furthermore, overheating causes the oil to lose its lubricating qualities absolutely necessary for proper operation of all types of pumps and valves, resulting in scoring, galling and oxide film formation on precision parts. Excess heat causes sweating of the tank to occur adding dangerous moisture to the oil and causing it to break down with the formation of rust and oxides and acid derivatives which begin to circulate in the form of minute abrasive particles in the circuit. When an oil is brown instead of water clear it is an almost sure sign of overheating at some time or other, indicating acid breakdown of the oil which presages costly downtime.

Again, we find the fault not entirely with the molder. There exists a considerable difference in the appraisals of the various machinery houses as to the kind and extent of injection machine cooling required. Engineers typically underfigure the cooling, probably forgetting that in many places the water supply becomes low and warm most of the year, and again allowing theoretical consideration to take precedence over practical ones.

Indeed one make of machine has the cooling so piped that the faster the machine is cycled (and the more cooling is needed) the less becomes the amount of oil going thru the cooler, as it is used in the circuit instead. By taking oil from the main relief valve for cooling as in this instance, all the oil coming from the cylinders in actual operation is not available for cooling, but goes directly back to the tank. Where machines of this type run dangerously hot, repiping to cool all the used oil thru an extra or auxilliary cooler often pays for the needed parts in reduced downtime and oil savings in a very brief period.

Certain full hydraulic machines also tend to run dangerously hot. Tacit recognition of this fact is given in the fact that medium or medium heavy oil is specified. However, in machines of this type, installation of an extra cooler is often a real economy, because pump repairs run into thousands of dollars. When incoming water is low in pressure and warm or when false efforts in economy are made to reduce the water supply to save on water costs, (or when someone forgets to turn the cooling water on) look out for trouble from hot oil! Oil temperature gauges are available so that the present guess work in this regard can be eliminated, especially on larger equipment.

REFRIGERATED RECIRCULATING SYSTEMS

So serious is the problem of overheating in the injection machine field, and so costly is a fully adequate supply of cold water becoming in many places, that various expedients are tried. A well is one "out," provided local water does not carry objectionable salts which when present quickly ruin any cooler, and fill mold passages and pipes with insulating layers of carbonates, sulfates, etc. which cannot be removed. Softening of such water is very expensive, and has been discontinued in the plants where once used.

Two wells, one for supply and one for return are often tried. But the earth is a remarkable insulator and underground water does not flow fast enough to dissipate a great deal of heat, with the result that temperature build-up occurs, as in tanks or other closed circuits, and the water soon becomes useless for cooling purposes.

The matter of cooling towers has received some attention, but here the objection is that the cooling obtained from towers is always only a few degrees below ambient temperature. When the weather is warm the water also warms up until only the differential between wet and dry bulb remains—and this is not enough to condition water for efficient cooling of the injection circuit (machine AND mold) during the May-September period in particular.

Recently, several installations of the refrigerated recirculating type have been made in the injection field with very positive results. Not only has machine downtime been sharply reduced, (fewer leaks, fewer stuck valves, etc.), but oil life has been length-

*levelling, piping assembly strains, type of job, pressure, etc. etc.
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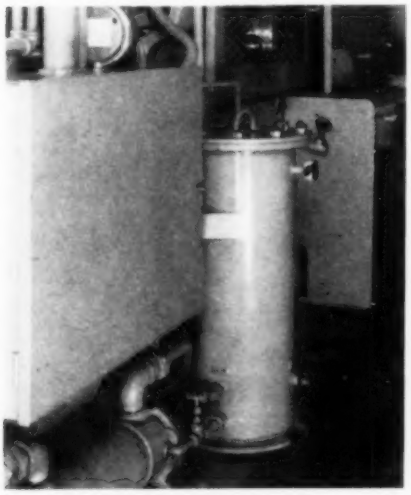
ned, and, in particular, production increased from 3 to 7%! Faster machine operation with cool oil on the one hand and quicker cooling of the part in the chilled mold on the other contribute to these figures.

Uniformity of operations of machine and mold thru use of constant temperature water has eliminated many daily machine adjustments and much scrap which previously seemed to have no specific cause, and which was taken for granted as a necessary evil, since cooling water temperature varied from hour to hour, especially as it does where towers are used, and production is actually tied to outside air temperatures.

So remarkable were the results of operation with uniformly chilled constant temperature (45°) water, that units are now available to cool the mold only, or both the machine and mold if necessary. These cooling units are engineered exclusively for the injection trade, and come complete in every respect except for local wiring



Ims-Hilco individual injection machine oil filter mounted on rear of Reed-Prentice injection molding machine at the plant of Tri-Mold Inc., in Buffalo, New York. Connection to machine oil circuit shown at bottom of filter.

and piping into the plant water system. Installations have to be individually engineered to take account of future expansion, water costs, etc., as well as estimated savings offset against cost of refrigeration equipment and power consumed by it.

Since **uniformity** of plant water temperature at all times seems to be the chief source of added savings from closed systems, two types of circuits are offered. One is the open type, where the refrigerated circuit output is held constant by controls, and city or pond water is used to cool the compressor unit, the water so used being then passed to drain. The other is the completely closed type where savings in water used are also important. Here the circuit is completely closed, with a cooling tower being used to cool the compressor water. Again, output of the refrigerated water is held at a constant temperature by controls, and the compressor cooling water passing to and from the cooling tower takes care of the variations formerly carried to the injection circuit, disrupting the molding cycle and varying part quality.

While pipes should be wrapped in using the refrigerated circuit, no other objection has been encountered. Naturally, the volume of water needed at 45° is much less than at elevated temperatures, so that oil coolers and mold passages which were seasonally inadequate are eliminated as a source of lost production when uniformly chilled water is used. In addition oil life is lengthened, leakage cut down, and other hydraulic troubles are reduced when oil is properly cooled at all times.

THE OIL TANK MAGNET

There is typically found being circulated in the injection machine circuit a certain amount of finely divided iron and magnetic oxide particles. This seems to be true even if filters are used, and appears to come from wear of parts, oxidation, and rust. The particles settle somewhat in the tanks, with the top layers being swept back into the circuit, particularly when the sediment is agitated by relief valve discharge into the oil tank. To combat this condition, a special large surface magnet has been developed to be placed in the bottom of the oil tank where the iron particles settle and lurk out of reach of filters. The plates pick up a teaspoon of particles from almost any injection machine, and require no maintenance except wiping off about once a year to remove accummulated particles. Molders using this additional safe-guard express amazement at the amount of abrasive iron present, and its removal definitely contributes to longer pump life and less wear on valves and other internally lubricated parts.

OIL STORAGE AND OIL SALVAGE

The **chief** hydraulic problem in the injection plant however, has always been (and is today) mainly a matter of keeping the hydraulic oil clean and pure. To combat the constant hazard of contaminated oil drums which frequently ruin oil being taken from a machine during repairs, a line of special clean oil storage and decanting tanks designed expressely for use in the modern injection plant has been offered to the trade. To reduce the relatively large expense incident to spilled oil and leakage which continually harass the injection molder, the decanting and oil salvage tanks have several unique features. A screen type lid is used in the receiving opening of the tank to remove particles of plastic and other material which is found in spillage. A cone type sump is provided to act as a heavy sediment trap, and is equipped with a valve to allow water and settlings to be gently drawn off without disturbing the salvageable oil. When makeshift decanting is performed in ordinary drums, some contamination always results because of difficulty of separating settlings and oil. To allow only the cleanest oil to be removed from the decanter, a special float type outlet has been designed to carry the actual outlet at the top of the oil level, permitting withdrawal only of the top undisturbed layer of oil. The clean oil tank is similar in external appearance to the decanting tank so a neat looking installation of the two units can be made.

FILTERS IN THE INJECTION PLANT

Before reviewing the special purpose filters now available for exclusive use in the injection plant, a word is in order about the types of oils specified for injection hydraulics.

As a general rule a "Light" hydraulic oil is ordered for vane type and a "Medium," or "Medium Heavy" grade for piston type pumps*.

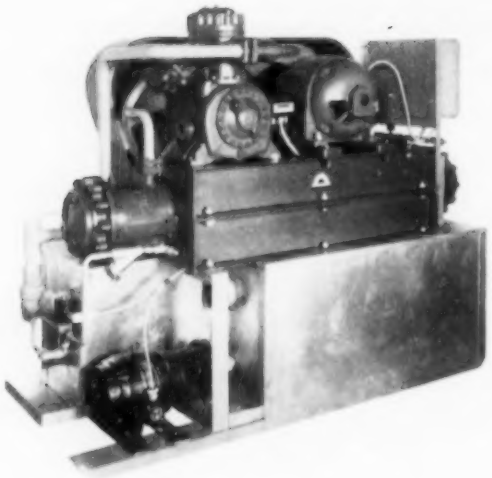
When either type of machine runs consistently hotter than normal, there is often a saving in downtime if one grade heavier oil is used than normally specified. Some molders do this as a regular practice to reduce leaks and gain machine speed, and because of the type of service demanded of injection oil, there is no harm therein—in fact it would probably be "officially" recommended if injection hydraulics were ever singled out for the special study deserved by the use-severity of the typical circuit.

Now the question of additives and inhibitors used in the various oils to suppress frothing, reduce oxidation, counteract acid and wax formation, and improve the viscosity, invariably arises when the use of filters to reclaim and maintain oil quality is proposed for the injection molder. Oils with additives are considerably more expensive than untreated oils successfully used for years in the injection industry, so naturally the molder is concerned when the oil salesman implies filters may remove the additives.

Exhaustive tests run in injection plants all over the country prove that only one type of filter—the earth type, will correct the oil for acidity, remove moisture and deleterious oxidation products, and leave the oil in condition "as good as new." Cellulose type, mechanical disc type, or other filters do nothing more than remove physical dirt from the oil and it is not very often that physical dirt particles cause serious downtime in injection plants, except in new machines, or where dirty oil barrels are accidentally used, as does frequently happen.

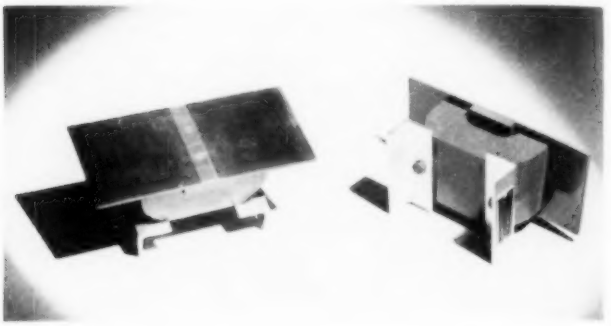
The chief argument applied against

*Within the range of the writer's experience these oils have proven very stable: Socony Vacuum DTE, Texaco Rubilene, Sunoco Sunvis, Gulf Harmony A, Houghton Hydraulic Oil, Etc.



← Typical self-contained refrigerated recirculating unit capable of handling all cooling requirements for 58 ounce injection molding machines.

Injection machine oil tank magnet developed to pick up fine or microscopic tramp metal from injection machine hydraulic circuits.



the earth type filter is that it removes the additives (oxidation inhibitors, anti-rust compounds, etc., etc.) from modern oils. Actually tests prove that when a NEW cartridge is installed in an earth-type filter, it **will** remove a small percentage of certain types of additives only, and it removes **these only until the cartridge is saturated,** whereupon ALL the additives present in the oil before filtering are found in the recovered oil after filtering, except for the miniscule percent removed in originally saturating the new cartridge. Comparison of oil consumption between plants using physical filters and fully corrective filters consistently reveal only the latter produce any marked savings and justify the expense and trouble involved in establishing correct filtering procedures.

This is undoubtedly because, as we have seen, of the unusual abuse oil receives in the injection machine circuit as contrasted with presses, machine tools, etc. where other types of filters can be used successfully. Furthermore when earth type filters are dirty they tend to resist the oil flow and the operator is warned by an increase in pressure that the element needs changing. If **not** changed however, the earth type filter will not pass dirty oil back to the circuit as can happen when certain other types of filters are saturated with residues.

TYPES OF FILTERS USED IN INJECTION PLANTS

There are two general types of filters which are suitable for use in the average molding plant—the integral and the portable.

Integral filters must have certain features to be safely installed in the injection circuit. They should be of heavy, **all-steel,** explosion proof construction. They should have a built-in preferably internal relief valve so that in the event of any unforseen obstruction the filter will not burst. Furthermore, they should have a very large earth capacity to reduce the frequency of maintenance, and to handle a relatively large volume of oil without restriction, because small filters are quickly rendered useless unless constantly attended—an unlikely eventuality in the average injection plant.

Integral filters are easily piped into any injection machine circuit. If installed in a low pressure line, no restriction or pressure reducer is necessary. If bled into a high pressure line, the intake should have preferably a pressure reducer installed ahead of the filter, or else a needle valve to permit the volume of oil flowing to the filter to be controlled. The return line flow from the filter to the machine oil reservoir should have a sight glass to allow the clean oil flow to be observed. Most filters have pressure gauges on them for safety reasons and to show when the cartridge needs changing. The typical injection machine filter of the integral type needs a replacement cartridge only about twice a year in normal use.

The second kind of filter, (and perhaps the more suitable of the two types if a choice has to be made) is the portable model, dolly mounted, with draw bar. Heaters on the portable filter are sometimes suggested where cold oil is to be handled with maximum filter efficiency. For general injection plant use however, heaters are not absolutely essential for two reasons. The grade of oil to be handled is light, and if the filter is piped directly into the oil reservoir with the injection machine in operation (as is recommended) the oil is already at the optimum filtering temperature of about 120° F. Portable filters so used do not interfere with ordinary production, and when regularly used will definitely forestall 95% of all hydraulic troubles.

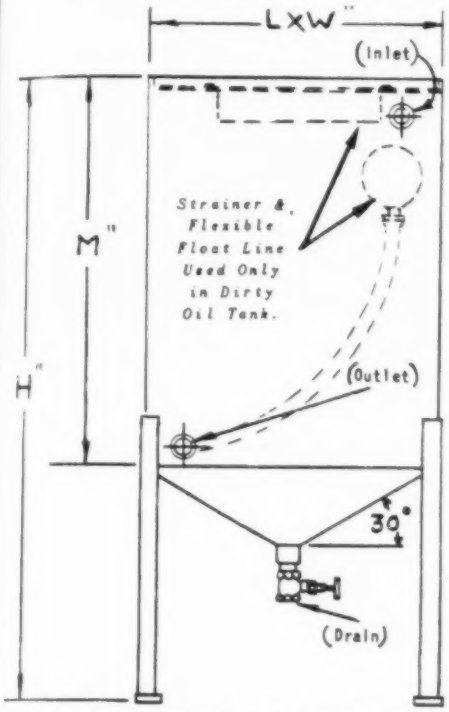
A portable filter can handle any number of injection machines, so that if four or more machines are installed in a plant the original cost of integral filters exceeds that of a portable unit. Furthermore portable units (with intake traps of the mechanical filter type as should be provided to lengthen cartridge life) can be used to salvage hydraulic spillage by connecting them direct to decanting tanks. This salvage operation is generally carried out just before a cartridge change. If moisture is present, and if the filter does not have heaters, capacity of the filter will be slightly reduced in gallons per hour, but operation is not interfered with, and the units may be left unattended. Cartridge life is a variable, but averages about 7-10 machines, operating for 24-48 hours on each machine. If **excess** moisture is present, filter capacity is sharply reduced and pressure increases abruptly. By allowing the filter to stand 8 hours, and then withdrawing the accummulated moisture from the bottom drain before commencing filtering again, as much as 2-5% moisture may be removed from injection machine oils, a vital factor in machine life. This moisture spontaneously appears from sweating of tanks and coolers, and seems unavoidable. Cellulosic and mechanical filters will not handle it, and it tends to unite with sulfuric acid residues in the oil and to plate out on internal surfaces in the form of a brown scale. Regular use of an earth type filter holds this destructive process to a minimum.

Portable filters, having their own motor pump sets are useful for handling oil, as in filling and emptying machines, or transferring it from barrel to barrel.

Records from various plants prove that in **salvaging spilled oil alone,** the average portable filter is paid for often in less than a year, again pointing to the choice of the portable filter instead of the integral. The latter of course do not have the auxilliary uses found for the portable model. Some plants use both types with great success as positive insurance against all hydraulic downtime.

WATER IN INJECTION SYSTEMS

Occasionally due to a damaged cooler, leaky mold connections, or even a stray hose leaking into the tank, large amounts of water get into the injection machine circuit. There is no short cut possible to get it all out. The emulsion must be removed. Tick the machine starter switch after the tank is empty and discharge the cylinders by starting them and stopping them midway. Wipe out tank. Refill with new oil. Repeat cleanout. Refill with new oil and repeat cleanout and refill with new oil. Such an experience as the **three oil changes needed to clean up a water logged machine** in itself invariably sells the molder on filtering and decanting!



Special IMS hydraulic oil decanting tank designed for injection plant oil salvage operations with strainer top, float type outlet and bottom drain for sediment removal.

PERSONNEL TRAINING TO ELIMINATE HYDRAULIC MAINTENANCE

The neglect of hydraulic problems in the average injection shop is rather suprising since operations are usually on a 24 hour basis, and downtime is very costly, especially during the industry's seasonal peaks. Of the some 1200 shops where injection machines are installed not more than 40% have facilities for quickly coping with major repairs occasioned by neglect of the hydraulic system. This fact alone makes the matter of hydraulic maintenance measures worth more serious attention by management.

There are two types of problems involved in educating injection molders about hydraulic maintenance. The first is in convincing the management of the extent and nature of the out-of-pocket and indirect expense incident to failure to authorize preventive measures. Injection plants as a rule are not long on maintenance, and it is usually difficult to get authorization for filters, decanting tanks, oil tank magnets, extra coolers, etc., until an emergency has arisen and the expense incident to the breakdown has conviced the management that preventive measures are cheaper than remedial ones.

And then there is the problem of educating foremen and operators to regular and correct use of the equipment when it is actually provided. Failure to turn cooling water on can begin breakdown of oil which will eventually lead to pump failure. Failure to replace filter cartridges will negate the use of the filter. Failure to use the filter on a regular schedule will allow acid-scale to begin to form, and so on.

Only a regular follow-up by management to assure that all precautions outlined in this paper are being faithfully taken will assure that oil condition is not being neglected. Actually, the rules are very simple. Use clean oil only, use a filter regularly. Salvage waste oil in the special containers never to be confused with so-called "clean" oil drums. Install a magnet in the oil tank to catch heavy iron sediment. Keep the oil cool at all times by installing an extra cooler if necessary, or a chiller. Replace all chronically leaky tubing with pipe or hose. Such basic steps are all that the injection molder need take to reduce the hydraulic troubles peculiar to the injection circuit to the vanishing point. And yet it is amazing how reluctant many plants are to try to forestall hydraulic trouble by following the foregoing suggestions.

8th SPE TECHNICAL
"Plastics Horizons"
CONFERENCE
Edgewater-Beach Hotel, Chicago

STYRENE MOLD FLOW TOPIC AT S. E. MASS.

By SAM CAIDIN

Our speaker was Mr. G. D. Gilmore, of the Plastics Basic Research Laboratories, Dow Chemical Co., Midland, Michigan.

Mr. Gilmore's subject was on the study of mold pressure cycles with relations to pressure time and temperature, and was devoted to the molding of polystyrene. His talk was one of the most interesting given at our meetings, as it was greatly aided by motion pictures, showing how molding material reacts when it flows into a closed cavity. Through an ingenious setup and the use of a glass plate, actual moving pictures were taken of the entry of polystyrene into a mold, and its reaction within the closed cavity. The showing of the pictures was preceded by slides, giving the theories of the reactions actually shown in the motion pictures.

As an added fillip to his talk, Mr. Gilmore presented a most amazing molding problem analyzer, completely bedecked with switches, lights, and labels, showing the various problems that a molder would meet in regular operation, and by throwing the proper switches, answers to problems would be given. After the machine had answered some simple problems, switches were thrown for six different problems, and the analyzer, after much agitation and clicking of mechanism, glowing of many lights, gave off a beautiful explosion and presented a card advising the molder with all these problems to go out of the molding business.

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USE OF CONTROLLED AIR-POWER FOR PLASTICS PLANT WORK IS NEW YORK TOPIC

Round Table On Molding Problems Featured

By ARTHUR M. MERRILL

Some 47 members and guests of the New York Section attended a regular meeting on October 17 at the Gotham Hotel. Feature of the meeting was a talk and sound film on "Production Miracles Through Controlled Air Power" by Harold W. Lamb, Bellows Co. Mr. Lamb substituted for H. P. Granger, Bellows Co., who had originally been scheduled to appear. The meeting program, as usual, included a cocktail hour, dinner, and business meeting prior to the technical session.

Mr. Lamb discussed and illustrated the use of Bellows air cylinders, air motors, and Hydro-Check air-hydraulic cylinders to provide fast, controlled, and economical straight-line motion in all types of industrial processes. Some of the applications covered were the operation of vises, fixtures, and collets; the feeding of stock in different machining operations; powering of drills, arbor presses, and staking machines; the opening and closing of rubber and plastic molds; and many others. The talk was followed by a lively discussion period, with many questions on new applications being raised from the floor.

In the business session, Section president George Baron, Ideal Plastics Corp., announced the appointment of a nominating committee to select a slate of candidates to fill the three vacancies on the board of directors. William Lewi, Dusal Tool & Mold Co., acted as committee chairmen, and other members included Murray J. Beck, Leaf Plastics, Inc.; G. Palmer Humphrey, G. P. Humphrey Plastics; Harold H. Schwartz, Empire Brushes, Inc.; and Sanford S. Zimmerman, F. J. Stokes Machine Co. This committee convened after the regular meeting and selected the following slate of candidates: Bryce M. Batzer, Plastiline, Inc.; J. Martin Voegtlen, Celanese Corp. of America; and Messrs. Beck, Lewi, Schwartz, and Zimmerman.

Mr. Baron also announced the appointment of Saul Blitz, Noma Electric Corp., as chairman of the arrangements committee for the Section's annual Christmas party, with Mr. Lewi as vice chairman. Reports were also heard from secretary-treasurer Arthur GeWertz, manufacturers representative; membership chairman Russell H. Skidmore, Celanese Corp. of America; favors and prizes chairman Richard F. Stott, Stott Tool & Machine Co.; and Mr. Schwartz, the program chairman, who also introduced the speaker.

Inaugurating a new program of providing assistance to the members in their work, a period was set aside at the end of the business session for the discussion of problems encountered by the members. Irvin I. Rubin, Robinson Plastics Corp., discussed and illustrated a problem involving the burning of an injection molded part which had been solved by changes in gating. A question involving the decorating of butyrate parts was raised by Bruno E. Wessinger, Wess Plastics Molds, Inc.; and another concerning the shrinking of acrylic parts around a copper wire insert was brought up by Mr. Batzer.

Table favors were distributed through the courtesy of Plastics Products Co., and the meeting closed with a drawing for door prizes contributed by Mr. Rubin, and Winslow A. Ward, American Cyanamid Co.

The New York Section was host to the Newark Section at a joint dinner meeting on November 14 at the Gotham Hotel. Highlight of this meeting was a talk on "Mold Temperature Control for Injection Molding," by H. A. Meyrick, president of Industrial Mfg. Corp.

The New York Section's growth continued with the addition of six new members during October, making a total of 37 since February. The new members added are: Michael T. Callahan, Polychemicals Dept., E. I. du Pont de Nemours & Co.; Walter E. Hirtz, A. Bamberger Corp.; Robert M. Joffe, Moulding Corp. of America; Donald L. McLellan, Bakelite Corp.; Arnold M. Meyer, Jr., Bakelite Corp.; and Joseph F. Quinlan, Polychemicals Dept., Du Pont.

Material Supply and Hydraulic Problems at Philadelphia

By CHARLES C. DAVIS

About 77 members and guests were present. President Bracken welcomed new members to the Society and introduced them to those present. He also announced closing of Prize Paper Contest on October 15.

A panel discussion on injection molding was the feature attraction of the evening. Arthur Hyde of the A. L. Hyde Company, of Grenloch, New Jersey, was chairman and led off with comments on material supply situation. He noted that all ordinary materials were currently in good supply except polyethylene. Shortage in copper and brass for inserts and assembly components are holding up production of some new jobs in plastics. Mr. Hyde also mentioned some of the predominant features and problems connected with preplasticizers.

A. R. Morse of Injection Molders Supply of Cleveland spoke concerning maintenance problems connected with the hydraulic systems in injection machines. He discussed such factors as overrating of piping, insufficient oil cooling capacity, and dirty, hard, or acid water for cooling, and recommended suitable equipment to remedy and prevent resultant maintenance.

George Whitehead, Sales Manager of Improved Paper Machinery Company, of Nashua, N. H., discussed preplasticizer design. He also outlined the trend in overall injection machine design to larger machines, with features to permit faster cycling, including prepacking or stuffing. Overall improvements are resulting in simplification, easier maintenance and less vibration and noise.

W. J. B. Stokes of Stokes-Trenton Inc., of Trenton, New Jersey, discussed problems of machine design relating to operation of molds. He asked that consideration be given to incorporating provision for ejector mechanisms behind the stationary platen, and take-off fittings in the hydraulic and electrical circuits to furnish power for cylinders and motors used in more complicated molds of present practice.

A question and answer period followed the panel speakers, who had aroused considerable interest, and some members contributed information from the floor.

N. W. Penn Notes

By PAUL ROCHE

Robert B. Way has transferred his affiliation to Northwestern Pennsylvania Section. He has just set up a new company, Finish Engineering Co., at 1115 Cherry St., Erie., Penna., specializing in production painting, decorating, and detailing. Mr. Way is well known to the plastics industry having been Chief Engineer of Conforming Matrix Co. of Toledo, Ohio, until recently. Mr. Carl Hersey, former plant superintendent of Conforming Matrix Co., is associated with him in the new venture.

David Byrd has just submitted his application for membership in the S.P.E. Dave is a brother of William R. Byrd and is superintendent of Byrd Tool & Mold Co. of Erie, Penna.

Karl Eckberg became associated recently with the tool department of Parker White Metal Co. of Erie, Penna.

Injection Molding Equipment of the Future

By RICHARD A. RYBAK

R and K Tool and Die Company

The plastic molding industry has made tremendous progress in the past few years mainly as the result of two equally important factors; (1) the continual development and introduction of new or modified molding powders, and (2) the continual improvement of molding equipment to handle these materials. Yet it seems there always has been a standard hidden factor in every machine; the question of the machines actual molding capacity. Out of necessity the molders themselves started "souping up" standard machines with over-size cylinders and the machinery builders were quick to catch on and follow it. The result, naturally was good and it proved one important point—most standard cylinders were undersize in the first place.

This all leads to the present trend of molding equipment. Naturally machinery manufacturers are governed to an extent by what the molders want and it is quite apparent that when a molder purchases an "X" machine he would like it capable of shooting "X" ounces. The tendency, therefore, is toward larger cylinders or auxiliary pre-plasticizing cylinders on more or less standard machines on up to the present offering of a 300 ounce machine.

The introduction of equipment of this size (300 ounce) machine seems a little premature for a number of reasons which are purely the writer's opinion, and are not meant to degrade anyone's effort in satisfying a potential need.

A molder in entertaining the thought of a 300 ounce machine, must consider numerous contingencies that go along with a molding machine of this size. First off, two identical machines would be essential from a practical molders stand-point for reasons be-known to all molders. Secondly, in almost every case, present equipment, such as dryers, grinders, and mold handling equipment, is too small to handle the needs of this monster. Finishing and shipping facilities in 99% of present molding plants would be unquestionably too small and incapable of handling the daily output of even one of these machines. As an example; one of the first undertakings in the "large part" field will be a complete one piece refrigerator inside liner roughly 3′ x 4′ x 1½′ deep. These parts, whether shipped 50 miles or 500 miles will have to be crated—something like a miniature bathtub. This calls for a great deal of handling, high cost of preparation for shipping and the demand for tremendous storage space in the molders plant.

Another relatively difficult problem is the finding of mold-making sources capable of tooling extremely large molds and located reasonably close to the molder. It is surprising how few mold-shops capable of handling molds of this nature could be found. The problem of making molds for 300 ounce presses could be a topic in itself. First of all it will take mold-makers bugaboo "time"—to locate a tool steel forging of a dimension of say conservatively 2′ x 4′ x 5′. Since there would be a tremendous risk in heat treating a piece of steel this large it is probable that most large molds will be of a pre-heat steel with a Rockwell hardness of around 40 maximum. Due to the large and deep cavities most present mold makers could not handle such molds, and the molder will then have molds, or at least basic machining done by whoever has equipment capable of handling the job. In other words the "control" over the job of building a mold will be gone. Some may be lucky and some may find misfortune because there can't be one slip when tooling a large mold in the "solid". The stamping boys are fortunate in that a die for stamping automobile tops or doby sections can be made in sections—easily handled, heat-treated, or replaced.

Tooling would require a minimum of four months to complete; plus designing and other incidentals making a total of six months from the purchase order to the part.

In general, the installation of such large equipment in a custom molders plant would cause so much unusual procedure, plant revisions and additions that it would not be practical. The average cost of a two 300 ounce machine installation would probably be around three-quarter million dollars. Most custom molders couldn't afford such an expenditure and if they could, they must have obtained this amount via the use of today's moderate capacity machines.

The proper place for machines of this size is not in a custom molders plant; they strictly belong in the manufacturers plant where parts produced are conveyed through the assembly line and go out the door in a finished unit. The logical comparison is that of the automotive field, where large punch presses are required to stamp out fenders and body sections. This is done on the assembly line, not by a custom metal stamper who would have the same problems and contingencies mentioned relative to that of large molding presses.

Custom molders will stick to equipment of nominal size to handle a range of products. There will be, undoubtedly, a trend toward two distinct types of molders in the injection field classified "Small Parts Molders" and "Large Parts Molders". Where the line of demarkation falls is not certain and of little consequence. It may be that "Small Parts Molders" will range up to 20 ounce capacity and "Large Parts Molders" will range from 20 ounce to a maximum of 60 to 100 ounce capacity.

It boils down to the fact that molders will want better and faster machines within this range. By *better* is meant a design such that most of the hydraulic piping, valves, solenoids, and the like, are easily accessible. That the replacement of cylinders can be made quickly and easily. Improvements certainly can be made in feed control and temperature control, cylinder design and general versatility of the machines. Capacity ratings should be made on the basis of styrene and to rate a machine "X" ounces it should be capable of shooting "X" ounces over a given area at a given cycle. For example; to rate a machine of 8 ounce capacity, it should be capable of shooting a piece 10″ x 10″ x .125 thick at 100 shots per hour.

It is the writer's opinion that the machine of today with these improvements will be the machine of tomorrow. Completely automatic presses are just as much out of question as excessively large equipment. There will still be an operator at every machine in a custom molders plant ten years from now.

The molding of plastic materials requires the human element to compensate for unpredictible malfunctions and diurnal variations. In the case of completely automatic molding, there again is only one place for equipment of this kind; in the consumers plant where automatic devices, gate cutters, inspection and assembly are accomplished in a continuous sequence.

(Continued on Page 18)

What's New?

The Hydraulics Division of Wabash Metal Products Company, Wabash, Indiana announces a new 3-ton Wabash "Econ-O-Press," model number 3-8. The unit is designated for photographic laminating shops, laboratories, and manual training shops, or anywhere moderate pressure with heat may be needed.

The Center Tool Mfg. Co., 2707 W. Van Buren St., Chicago 12, Ill., is now marketing a combination slitter-rewinder which operates on a single shaft without interleaving or fusing. The tool operates at speeds up to 700 feet per minute with razor blades or rotary cutters against a hardened steel rool. It is useful in slitting plastic of from 2 to 40 Ga. 14 models of various sizes are available.

General Control Co., Boston 34, Mass., has developed for industrial use a new maintained-position switch. Known as the type "A-C-O" switch, its operation is such that the first press transfers the contacts and the second press restores them. Unusually fast switching is permitted by the return-action design of the operating plunger mechanism, which is insulated from the contacts.

A stand for use with standard models of the Brookfield Synchro-Lectric Viscometer, which permits the testing, study, and control of highly plastic materials, regardless of degree of thixotropy, has been developed by Brookfield Engineering Laboratories. With the stand, measurements in relative centipoise values may be obtained for materials having characteristics similar to grease putty, shaving cream, gelatin, or wax. For more information, write Mr. Wm. Bernard Brookfield, Brookfield Engr. Labs., Stoughton, Mass.

CHICAGO

(Continued from Page 6)

Society of the Plastics Industry, Inc., at Manchester, Vt. Special emphasis was placed on the impact of the latest NPA and OPS regulations upon the plastics industry. With the exception of several specialized materials, a generally favorable outlook was reported for most plastics during the coming months. However, it was also pointed out that a 40 to 60% decline in business is expected in the industry during next year, primarily due to government restrictions on three of the major markets using plastic components—refrigeration and appliances, radio and TV, and automotive.

The basic problem goes back to a shortage of metals. For this reason, the chairman stated, the plastics industry should concentrate its attention on items which do not require metal components and on applications in which plastics can do an effective job of replacing other materials in short supply. He cautioned, however, against improperly engineered replacement applications and warned that the industry should guard itself against a possible period of cut-throat competition in the months ahead. Mr. Rau said that the aggressive, imaginative molder should be able to keep busy with the improved supplies of materials available, and that old fashioned selling would again be in order.

Frank Zehrle, Army Ordnance Dept., Chicago District, discussed some of the principal plastic items now under procurement and explained procurement procedures. He also mentioned several other possible items having a large volume potential, such as table-ware, fuses, etc. The M-52 fuse, for example, an important application of World War II, is to be produced in the future of either die-cast metal or plastic, under revised specifications.

Dr. Russell W. Ehlers, Army Quartermaster Corps, Washington, D. C., described some of the plastic items now under development or in procurement by the Quartermaster and explained the procedure followed in setting up research and development contracts on potential new items involving plastics. A question period followed each of the talks.

Ben Rau, chairman of the meeting, announced that some interest had been expressed in a week-end golf outing at Nippersink next spring, but that definite plans for such an event would depend upon the number of members who would support it.

Injection Molding of the Future

(Continued from Page 17)

If molding machine manufacturers concentrate on improvements on present day machine and incorporate a few seemingly trivial features, there will be the basis for the plastics industry to continue to grow at a tremendous rate. The rest is up to the material suppliers and the molders themselves. Continual improvements on present molding materials, the development of new materials, the utmost cooperation between material supplier and the molder, and the molders themselves, in applying materials to an application correctly and through the development of better technique in molding (which may well include air conditioned molding plants) will enable the plastics industry to stand out and accept the recognition that will be forthcoming and that the industry so justly deserves.

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ART OF COLOR MATCHING DISCUSSED AT NEWARK; ALKYD MOLDING SHOWN

Nominating Committee Picks Slate For 1952

BY ANTHONY NATURALE

The Newark Section of the Society of the Plastics Engineers held its regular meeting on October 10, 1951 at the Military Park Hotel.

Mr. Pete Simmons called the meeting to order and then asked Chairman of the Nominating Committee, Mr. E. B. Soules of Detroit Mold Engineering Company to give his report on the Committees selection.

Mr. E. B. Soules advised that the names appearing below had been selected by the Nominating Committee:

National Directors:
- Islyn Thomas
- Arthur J. Warner

Section Directors:
- Anthony Naturale
- David H. Garrison, Jr.
- W. W. Gryce
- Robert H. Hoehn
- John H. Cook, Jr.

Remember your ballots must be received before December 1, 1951 to be valid.

We then heard from our National President, and director, Mr. Islyn Thomas, who reported on the progress of the Chicago Meeting and reminded us all to plan on attending this meeting in January 1952.

The table favors for this meeting were donated by Claremold, Inc., Newark, New Jersey.

Our Program Chairman, Mr. Bill Willert of Hartig Manufacturing Corporation then introduced the Speaker of the evening, Mr. W. H. Peacock of Calco Chemical Company, Division of American Cyanamid Company.

Mr. Peacock spoke on "The Practical Art of Color Matching in Plastics." In his talk the speaker explained the significance and use of spectral curves of colorants in color matching. Mr. Peacock showed colored pictures that clearly illustrated his comments regarding identification and investigation of dichromatic or concentration effects and the use of the spectral curve for color matching. Another useful method used for color matching by those who do not use the spectral curve is the psychological color order system such as Munsell & Ostwell developed.

Mr. Peacock then spoke of the four principal ways of blending color agents.

I. HUE plus HUE such as RED plus YELLOW equals CASTS

II. HUE plus BLACK—SHADES

III. HUE plus GRAY—TONES

IV. HUE plus WHITE—TINTS

As a special added attraction Mr. B. Willert arranged with the Plaskon Division of Libby-Owens Ford Glass Company to have on display their mobile demonstration unit. The mobile unit was on display in a parking lot adjacent to the Military Park Hotel. The Unit was set up to show the molding of Plaskon Alkyd in Stokes completely automatic plastics molding presses.

This unit is really worth seeing so look for it and save your questions for Mr. Lowry and Mr. J. A. Joyce who do a swell job of running tests and answering your questions.

Our best wishes go to Mr. John Groesbeck who leaves the Newark Section. He is transferred to Indiana. Good luck John, we'll miss you.

Klippings from Kosy

By WALTER KOSY

Chrysler Corp.

By the time these notes get into print the November meeting of the Detroit SPE will be history and we'll be thinking about our Christmas party. From all current indications, however, Carl Beier's talk on the merchandising of plastics on November 8 at the Rackham Building will be a sell out and we sincerely hope that you didn't miss it. We'll give you a full report on the meeting in the next issue of this magazine.

Before we go on to the subject of our next meeting, however, we wish to express our thanks to Mr. Ben Grey, president of Toy Founders, Inc., who cooperated in securing Mr. Beier for this SPE meeting and contributed some of the door prizes.

The Christmas party this year will be held at the Wardell Sheraton Hotel, Woodward at Kirby, on Friday, December 7. As per custom, a Christmas gift drawing will be held with prizes for everyone. For entertainment, a movie and a talk by an outstanding sports personality is planned. Musical accompaniment will also be offered for those whose party tastes need expression in song.

Dinner is planned for 6:30 P.M. with a choice of meat or fish. Tickets may be reserved by calling Al Stomp at Una-Craft Engineering, Jefferson 6-7238, or they may be purchased from the following individuals:

- Mr. Harry Haaxma — Wolverine Plastics, Inc.
- Mr. Harry McGowan — Bakelite Corp.
- Mr. William DeGalen — Koppers Co.
- Mr. Don Hoffman — Evans-Winter-Hebb
- Mr. Ray Richards — Bakelite Corp.
- Mr. Courtney White — Hercules Powder Co.
- Mr. Walter Kosy — Chrysler Corp.
- Dr. Ernest Storfer — Chrysler Corp.
- Mr. Jack Totten — Ford Motor Co.

We hope to see you there!

We recently saw an announcement that Carl E. Holmes, formerly general manager of the General American Transportation Co., Plastics Div., in Chicago, Ill., has become associated with the Camfield Mfg. Co. of Grand Haven, Mich. Carl is a former president of the Detroit Section of the SPE and is well known in these parts as a capable administrator and engineer. Best of luck to you, Carl, and welcome back.

Another good friend of the SPE in Detroit left when Roy Lyon, manager of the Lyon Design Co. took a job with Plastic Specialties Co. in Ohio. Roy was a director of the Detroit Section and served on various committees in the past.

His leaving left a vacancy on the board of directors which was filled by Courtney White of the Hercules Powder Co. Mr. White will serve out Lyon's unexpired term.

Still another transfer was that of Tom Martin, manager of the Detroit office of the Monsanto Chemical Co. Tom has been given a leave of absence to serve as chief, thermosetting unit, plastics section, chemical division of the National Production Authority.

QUEBEC MEETS

By PETER HERSEY

The Quebec Section of the S.P.E. commenced their 1951 Fall program with a stag dinner party. Approximately twenty-five members and guests were on hand to make the evening a spontaneous success. Mr. Jack Thomas of Dow Chemical, Montreal, provided entertainment in the form of a chalk talk, and then with a few after dinner songs. Following the excellent entertainment, the balance of the evening and early hours of the following morning were devoted to a number of technical discussions.

The evening was an outstanding success to the guests and provided a welcome opportunity for the members to outline the purposes of S.P.E. and also mention that October would be the occasion for the first technical meeting of the Quebec Section of S.P.E.

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DESIGNING FOR MOLDS

(Continued from page 8)

illustrations will be furnished of these main mould elements, together with their application, and reasons underlying their use, as well as the advantages to be derived.

To a large extent also the question of mould design will be conditioned by the type of mould-making plant available and the kind of moulding press or injection machine upon which the finished tool will be used.

The basic requirements of any satisfactory moulding tool are briefly as follows:

(1) It should ensure the accurate, correct and uniform reproduction of the component form.

(2) It should be as simple as practicable.

(3) The method of operating the mould should likewise be of the simplest character to allow for economical handling and production of the parts.

(4) It should permit the most economical use of moulding materials.

(5) It should be capable of withstanding prolonged production service without developing errors, faults or failures likely to affect adversely either the quality, accuracy, or form of the component, or to incur heavy maintenance costs in retaining the mould in production service.

(6) The mould should provide for forming the component as completely as possible, to eliminate secondary machining, trimming or deflashing operations.

(7) The mould must be constructed from suitable materials which will not stain, dye or become roughened due to continued exposure to the moulding components.

Moulding Process Requirements

With the moulding process to be selected, another set of problems will arise for solution by the plastics moulding technician. The nature and extent of this set of problems is very briefly mentioned in this introductory article.

In the first instance, the designer will have to determine whether the component has to be produced in a thermosetting or thermoplastic material. Decisions on this point will settle whether the part can be compression or injection moulded.

Next he must decide what type, size and kind of moulding press or injection machine has to be employed. If the part has to be produced from a multi-impression tool, and consequently, from a correspondingly large mould involving a large projected surface area over the respective mould cavities, it will be necessary to employ a large and powerful moulding press which is capable of exerting the requisite pressure on the mould.

If, on the other hand, the mould can be a single-impression tool and the projected surface area of the mould cavity relatively small, a much lighter moulding press may be employed.

He has then to decide the exact form of moulding procedure to be adopted. This will embrace such points as the length of cure, the amount of pressure and squeeze pressure to be used, the length of the complete moulding cycle, in what manner the cavity formations are to be charged with powder, how the powder charge has to be measured, what type of gauges to use, and so forth.

In short, he will have to work out, largely as a result of cut-and-try methods with the actual mould, a whole procedure scheme for guidance of the mould operator.

If the component has to be produced as an injection-moulded part, here again the type of mould will determine the size of machine which can be used. The capacity of all the mould cavities must not exceed more than about 70 per cent of the whole delivery of the injection machine per shot.

Operating sequences, timing and operator instructions will also have to be determined. In addition, a scheme of inspection of the finished mouldings, however they be produced, will become necessary in order to ensure that the quality, accuracy and uniformity of the finished parts is maintained and customers' requirements in this respect are attained.

These, then, are some of the problems which will be considered in the sections of the series which will follow.

As already intimated, it is proposed to devote a number of sections immediately following the present one to the consideration of the various points affecting and determining component design. Having explained the basic requirements and the principles to be followed, successive sections will deal with the similar closely connected problems of mould design. Copious illustrations will be given of the various more or less standard types of mould construction to note their capacity, limitations and advantages, and particularly to show the inter-action between component design and mould design.

The final sections will deal with the development of moulding procedures for adoption with the various types of moulds. In short, the whole field of designing for plastic mouldings will be discussed and the many problems considered in detail, in conjunction with illustrated practical examples of components and moulds which have been found successful and economical in production use. *(To be continued.)*

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Letters to the Editor

TOSS FACTOR PROBLEM

To the Editor:

In the article by P. H. Ericksen on "Shock Loading of Plastics" in the October issue of the JOURNAL, reference is made to the fact that the toss factor "may amount to a significant percentage of the total energy expended when breaking a relatively brittle type of plastic."

The elimination of the toss factor, and the consequent determination of an impact strength more meaningful than that given by the Izod test, was the subject of an astute study by Bryce Maxwell and L. F. Rahm of Princeton University's Plastics Laboratory. To carry out this study, which was sponsored by several governmental agencies, the authors developed a basic apparatus which would seem to be adaptable to a new standard test apparatus.

As reported in the ASTM Bulletin for October, 1949, one conclusion of this research is that the toss factor in the Izod reading depends directly on the density of the materials and inversely on the true impact strength, the toss factor being in some cases more than half the observed Izod reading. Also, the Maxwell-Rahm tests yielded figures for the various plastics "in an order of relative impact strength which seem to agree with the observed impact strength of the materials in service." By the Izod test, for example, mica-filled phenolics would seem to be much stronger than the woodflour-filled formulation. In actual performance, the reverse is true, and the new test shows it.

William Schack

DREXEL SENDS THANKS

My dear Mr. Thomas:

Please accept our thanks for the honor that your association paid to Drexel Institute of Technology by being officially represented on October 31 at our dinner honoring the men and women of the Engineering, Management, and Scientific professions.

On this occasion, a central event in our Sixtieth Anniversary Convocation, more than 600 guests assembled in the main ballroom of the Bellevue-Stratford Hotel. Some seventy-five national professional, technical, and learned societies were represented there.

Drexel Institute has taken this occasion to confirm its purpose in higher technical education and to provide ever increasing educational opportunities for the many young men and women who will be among the scientists, engineers, and industrial managers of tomorrow.

I am quite certain that these young people will seek, as a professional goal, the attainment of membership in societies such as yours. Our colleges and professional societies have a common and great purpose, to advance the standards of practice and ethics in the professions we serve.

Sincerely yours,
James Creese

SPE MEMBERS

Let all members of S. P. E. make a special effort to attend the Annual Conference on January 16-18th at the Edgewater Beach Hotel.

The Conference Committee has been very active and has an excellent program prepared.

COMPANY REGISTRATIONS
Eighth SPE Technical Conference

List of Companies Registered on or Before December 10

AMERICAN CYANAMID COMPANY
30 Rockefeller Plaza, New York 20, New York
Representatives: A. T. Steele; J. Shannon; W. Ward; R. Hiller; A. Collins.

A. BAMBERGER CORPORATION & AMERICAN MOLDING POWDER & CHEMICAL CORP.
703 Bedford Avenue, Brooklyn 6, New York
Representatives: Gerald F. Bamberger; Walter E. Hirtz; Arthur L. Metzger; Justin Zenner; C. H. Whitlock; Herbert H. Goldmark.

AUBURN BUTTON WORKS, INC.
Auburn, New York
Representatives: John H. Woodruff; Merton R. Turrell.

THE BOLTA COMPANY
151 Canal Street, Lawrence, Massachusetts
Representatives: J. Bolton, Jr.; G. S. Laaff.

CATALIN CORPORATION OF AMERICA
1 Park Avenue, New York 16, New York
Representatives: H. Krehbiel; L. Beck; A. Malashevitz; E. Bostian; F. Hadley; B .Porter.

CHICAGO MOLDED PRODUCTS CORPORATION
1020 North Kolmar Avenue, Chicago 51, Illinois
Representatives: E. F. Bachner, Jr.; J. E. Johnston

DEROIT MOLD ENGINEERING COMPANY
6686 East McNichols Road, Detroit 12, Michigan
Representatives: L. J. Morrison; W. Kosobud

DOUGHBOY INDUSTRIES, INC.
215 North Main Avenue, New Richmond, Wisconsin
Representatives: Dr. C. R. Arnold; A. J. Miller, Jr.; R. C. Drury.

E. I. duPONT deNEMOURS & CO., INC.
Wilmongton, Delaware
Representatives: P. W. Crane; D. B. Hanson; W. C. Wall; C. G. Patterson; M. L. Shaw, Jr.; D. D. James.

DUREZ PLASTICS & CHEMICALS, INC.
North Tonawanda, New York
Representatives: H. B. Puff; R. J. Roach; F. W. Less; E. E. Woodman; E. F. Borro, Sr.; E. F. Borro, Jr.

FARREL-BIRMINGHAM COMPANY, INC.
25 Main Street, Ansonia, Connecticut
Representatives: E. H. Johnson; D. C. Chase; F. R. Hoadley, Jr.

FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Representatives: F. C. Means; J. F. Hronek; D. E. Flint; F. R. Zumstein

FERRO CORPORATION
4150 E. 56th St., Cleveland 5, Ohio
Representatives: Ralph Riggs; H. V. Fishkin.

FIBERITE CORPORATION
516 West Fourth Street, Winona, Minnesota
Representatives: John E. David; David Sharpe; Paul Fina; Paul Bury; R. W. Miller; Robert Harkenrider.

FLAMBEAU PLASTICS CORPORATION
501-03 Seventh Street, Baraboo, Wisconsin
Representatives: W. R. Sauey; H. D. Hulterstrum.

G. B. LEWIS COMPANY
426 Montgomery, Watertown, Wisconsin
Representatives: Dan Milunovich, George Stoeckman.

GENERAL AMERICAN TRANSPORTATION CORP.
135 South LaSalle Street, Chicago, Illinois
Representatives: A. N. Williams; G. L. Hansen.

GENERAL ELECTRIC COMPANY
1 Plastics Avenue, Pittsfield, Massachusetts
Representatives: J. L. McMurphy; C. H. Kline; P. Stahlberg; H. Poet; W. Goss, A. P. Landall.

GENERAL TIRE & RUBBER COMPANY
Wabash, Indiana
Representatives: Philip Magner, Jr.; Dewitt Eldred.

GERING PRODUCTS, INC.
N. Seventh Street & Monroe Avenue, Kenilworth, New Jersey
Representatives: Larry Gering; Herman Gering; Herbert Hopkins; S. Spivak; Wayne M. Schrag; Gerard C. Heldrich.

B. F. GOODRICH CHEMICAL COMPANY
324 Rose Building, Cleveland 15, Ohio
Representatives: J. R. Hoover; G. E. Field; O. E. Isenburg; W. D. Lahey; A. L. Hatfield; G. A. Fowles.

HERCULES POWDER COMPANY
Delaware Trust Building, Wilmington, Delaware
Representatives: A. R. Olsen: J. B. Martin; W. O. Bracken; R. D. Hanna; E. C. Wenger; E. W .Cronin.

IMPROVED PAPER MACHINERY CORPORATION
150 Burke Street, Nashau, New Hampshire
Representatives: H. M. Allard; G. G. Doughty; F. Z. Bailey; G. W. Whitehead.

JACKSON & CHURCH COMPANY
321 North Hamilton Street, Saginaw, Michigan
Representatives: James Hendry; Melvin Steggall; Milo Buzzee; Davis L. Perrot.

JOHN MACK & SON MOULDED PRODUCTS, INC.
6227 North Broadway, Chicago 40, Illinois
Representatives: John L. Mack, Sr.; John L. Mack, Jr.

LESTER ENGINEERING COMPANY
2711 Church Avenue, Cleveland 13, Ohio
Representatives: D. White; D. J. Sloane; W. H. Schwartz; J. J. Schmidt.

MIDLAND DIE & ENGRAVING COMPANY
1800 West Berenice Avenue, Chicago 13, Illinois
Representatives: A. J. Bachner; J. L. Sekowski.

M. W. KELLOGG COMPANY
P. O. Box 469, Jersey City, New Jersey
Representatives: Louis C. Rubin; W. J. Merck; Jules A. Jupa; F. M. Ruggles.

NATIONAL RUBBER MACHINERY COMPANY
47 West Exchange Street, Akron 8, Ohio
Representatives: H. E. Buecken; E. E. Heston; D. V. Blatter; E. R. Coddington.

NAUGATUCK CHEMICAL COMPANY, DIVISION OF U. S. RUBBER COMPANY
Naugatuck, Connecticut
Representatives: Dr. E. S. Ebers; H. M. Parsekian; R. H. Malamphy; F. B. Molen; W. deC. Crater; F. L. Hemingway; A. M. Stover.

PANELYTE DIVISION OF ST. REGIS PAPER COMPANY
North Enterprise Avenue, Trenton, New Jersey
Representatives: Paul E. Schmidt; Frank E. Card.

PLASKON DIVISION, LIBBEY-OWENS-FORD GLASS COMPANY
2112 Sylvan Avenue, Toledo 6, Ohio
Representatives: H. W. DeVore; J. Ferguson; G. T. Walker, Jr.

PLAS-TEX CORPORATION
2525 Military Avenue, P. O. Box 12396, Rancho Branch, Los Angeles 64, California
Representatives: Eugene Snyder (alternate Willard Lundberg).

PLASTIC RESEARCH PRODUCTS
200 Beech Street, Urbana, Ohio
Representatives: Richard E. Stockton; LeRoy L. Lyon.

ROHM & HAAS COMPANY
W. Washington Square, Philadelphia 5, Pennsylvania
Representatives: D. S. Plume; F. L. Fine; M. L. Brummer; E. F. Dourlet; J. F. Moore; R. C. Oglesby.

SERVICE PLASTICS, INC.
1118 West Jackson Boulevard, Chicago 7, Illinois
Representatives: M. Meltzer; C. Karels.

(Continued on page 10)

8th SPE CONFERENCE FEATURES VARIED PROGRAM

Panel discussions in Technical Activities, in Education, and Scheduling of Concurrent Sessions are new program ideas

WEDNESDAY, JANUARY 16

2:00-3:15—Session A

Presiding—Dr. James M. Church, Associate Professor of Chemistry, Columbia University.

"WHAT SHOULD PLASTICS ENGINEERS KNOW?"

Chairmen of the panel is Dr. Louis F. Rahm, Director, Plastics Laboratory, Princeton University.

Panel members are: J. Harry DuBois, Plax Corporation, Hartford, Conn.; J. W. Lindau, III, University of South Carolina; E. S. Bloom, E. I. duPont de Nemours & Co., Inc.; R. A. Hoffer, General Electric Co., Pittsfield, Mass.

BIOGRAPHIES:

J. H. Dubois

J. Harry DuBois, after receiving his B.S. degree from the University of Minnesota in 1927, was with the plastics department of General Electric Co. He joined the Shaw Insulator Company in 1944 as an executive engineer. Currently, he is manager of new product development for the Plax Corporation. The author of several books on plastics, Mr. DuBois was national president of the Society in 1948 and national vice-president in 1947. He was elected to life membership in SPE in 1949.

Louis F. Rahm received his B.S. degree in mechanical engineering from the University of Michigan in 1921, after which he was employed as a designer for several years by DuPont Viscoloid Company, New Jersey's Picatinny Arsenal, and the Burrough's Company. He taught for a time at the University of Illinois, then went to Princeton in 1926 where he has been ever since, except for a wartime leave of absence when he acted as plastics engineering group leader at the National Defense Research Council's High Explosives Laboratory. He has contributed technical articles to various technical journals and is the author of two books, "Plastic Molding" and "Plastics Technology."

Louis F. Rahm

ABSTRACT:

This panel has been selected to represent and discuss the interests of engineering education and industry. Mr. J. H. DuBois and Prof. J. W. Lindau, both members of the Educational Committee, are familiar with the problems and limitations of engineering instruction in the field of plastics materials, and with the educational program endorsed by the Society in 1949. Mr. E. S. Bloom and Mr. R. A. Hoffer have an intimate knowledge of industrial problems in this field and of the industrial needs in employing men for such engineering positions. The audience is invited to participate in the open forum with questions and comments, following the panel discussion.

3:30-3:45—Session A

Presiding—William K. Woodruff, Celanese Corporation.

"PLASTICAL ARCHAEOLOGY"

By Dr. Johan Bjorksten, Bjorksten Research Laboratories, of Chicago, New York, Madison, Wisconsin.

BIOGRAPHY:

Dr. Bjorksten was born in Finland, studied at the University of Helsingfors, Finland and Stockholm, Sweden; published work in high polymer chemistry, particularly proteins, which attracted the attention of the Rockefeller Foundation. He came to America in 1931 for postdoctoral work, then entered industry. He has held important chemical posts with the Felton Chemical Co., Pepsodent Corp., Ditto, Inc., and the Quaker Chemical Products Corp. He founded the Bjorksten Research Laboratories in 1944 and has been president and chairman of the board since that time. A co-founder of ABC Packaging Machine Corp., Quincy, Illinois, he has been a vice-president there since 1943, and president of the Bee Chemical Company from 1944 to 1946, which he also co-founded in 1944. Dr. Bjorksten is a patenter and co-patenter of about 50 patents, mainly in the plastics and organic chemical fields.

ABSTRACT:

The subject of plastics developments, in the past and future will be presented in the future tense, as an archaeological research project of 25,000 years from now. The period 1900-2100 will be covered, using accepted archaeological presentation methods. Photographic material especially prepared for the speech will also be presented.

3:30-3:45—Session B

Presiding—D. S. Plume, Rohm & Haas Company.

"EXTRUSION OF LARGE PIPING"

By E. C. Blackard, Tennessee Eastman Company, Kingsport, Tennessee.

ABSTRACT:

Laboratory techniques for the extrusion of sheeting, pipe and the variegated strip will be explained, following which will be a question and answer period. Large pipe will not be considered, as Tenite has done no research on pipes larger than 4" I.D. Sectional diagrammatic slides will be shown to explain the detailed features contributing to the better quality of extrusion. Practice will be treated rather than theory, with central emphasis given to the practices evolved in the Tenite Laboratory.

BIOGRAPHY:

Mr. Blackard graduated from Georgia Tech with a B.S. degree in Mechanical Engineering in 1934 and was immediately employed by Tennessee Eastman Company. He worked in the Acetic Anhydride Department, then in the Engineering Department. He developed a process for the extrusion of a soft sheet from cellulose acetate for the inner layer of safety glass. This process was later used in production. From 1940 to 1942, he worked as supervisor in the quality control laboratory in the Tenite manufacturing department. He served in the army from 1942 until 1946. Upon discharge, he returned to Tennessee Eastman where, in 1950, he was appointed Superintendent of the Tenite manufacturing department, which includes maintenance and process development and Tenite applications laboratory work.

E. C. Blackard

THURSDAY, JANUARY 17

9:15-10:30—Session A

Presiding—Alex J. Malashevitz, Catalin Corporation of America.

"ASTM STANDARDS AND THEIR EFFECT ON PLASTICS TECHNOLOGY"

By Robert Burns, Bell Research Laboratories.

BIOGRAPHY:

Mr. Burns has been active in the testing of plastics and electrical insulating materials for thirty years. He has written many technical papers and has contributed to the development of numerous test methods which have become national standards. He is past chairman of ASTM Committee D20 on Plastics and received the Society's Award of Merit for 1951. Since 1947 he has held the chairmanship of the National Academy of Sciences—National Research Council Committee on Plastics and Elastomers.

Robert Burns

ABSTRACT:

A discussion of standardization techniques for the evalulation of plastics, and their contribution to all phases of plastics technology from research to procurement. The speaker will also attempt to describe the "blood, sweat, and tears" leading to the adoption of a national standard and the natural feeling of elation when several thousand free Americans decide on a single course of action in the interests of industrial peace and unity.

10:45-12:00—Session A

Presiding—Edward Borro, Sr., Durez Plastics & Chemicals.

"MODIFIED PHENOLICS"

By Wyman Goss, engineer for General Electric Co.

BIOGRAPHY:

Mr. Goss has been with General Electric since he entered the field in 1929, holding positions in the control laboratory, in the development laboratory, and later as a group leader. Presently, he is in charge of all engineering activities in the materials laboratory. He has done developmental work with phenolics, silicones, rubber, resins, and varnishes.

ABSTRACT:

Mr. Goss will discuss phenolics modified with rubber to improve mechanical properties. Physical and mechanical properties will be discussed and actual applications and use tests will illustrate improved performance obtained. Molding techniques of these modified materials will also be discussed and potential new applications will be highlighted.

"STRESS GREMLINS IN THERMOSETTING PLASTICS"

By H. M. Quackenbos, Jr., of Bakelite Co., who is the second speaker for this Session A.

10:45-12:00—Session B

Presiding—M. Colburn Bailey, Koppers Co., Inc.

"MOLDING OF THICK SECTIONS"

By Gordon Thayer, Dow Chemical Co.

BIOGRAPHY:

Gordon Thayer received his B.S. degree in Mechanical Engineering from the University of Michigan in 1934. He then worked as a designer of special bakery and chemical machinery for Baker-Perkins Co. He later worked as a machine designer in Detroit and Jackson, Michigan at the same time serving as instructor at Jackson Junior College. He was employed by the General Industries Co., Plastics Molding Division in 1939. In 1941, he went to the Dow Chemical Company as molding research engineer in the Saran Development Laboratory. He is the author of a book "Plastics Molds," now in its third edition.

Gordon Thayer

1:30-3:00—Session A

"REINFORCED PLASTICS"

Chairman of the panel is A. J. Wiltshire, Apex Electric Mfg. Co.

BIOGRAPHY:

Mr. Wiltshire is a graduate of Tech High in Cleveland and the International Correspondence Schools. He has spent 29 years as a product designer of mechanical and

electrical units for domestic use. He is at present Chief Engineer of the Fiberglas Division, Apex Electrical Manufacturing Co., Cleveland, Ohio.

PANEL MEMBERS:

TRAYS—Bob Morrison (or Al Lavenhagen), Molded Resin Fiber Co., Ashtabula, O.

LARGE MOLDED PARTS — (Refrigerator Liner) Ralph Benson, Crosley Corporation, Cincinnati, Ohio, or, Charlie Jones or Bob Griffith, Structuralite Plastics Corp., Hebron, Ohio.

SHEET—Joe Finger, or Ray Meyer, Corrulux Corporation, Houston, Texas.

FURNITURE—Molded Chair—Milt Brucher, or Sol Fingerhut, Zenith Plastics Co., Gardena, California.

PIPE—D. Robinson or Herb Ennis, Perrault Bros., Inc., Tulsa, Oklahoma.

INTRICATE PARTS—Roger White, Laminated Plastics, Inc., Cleveland, Ohio, or, Victor G. Reiling, Kurz-Kasch, Inc., Dayton 1, Ohio.

PRODUCTION PROTOTYPES — Paul Omohundo, Paramount, California.

REINFORCED POLYSTYRENE FOR INJECTION MOLDING — Tom Demarco, Monsanto Chemical Co., Springfield 2, Massachusetts, or Bob Coutney, Bakelite Co., Division Union Carbide & Carbon Corp., New York, N. Y.

1:30-3:00—Session B

Presiding—Roman C. Brotz, Plastics Engineering Co.

"PREPLASTICIZERS"

By R. W. Powell, Hydraulic Press Mfg. Co., Mt. Gilead, Ohio.

BIOGRAPHY:

For 15 years, "Russ" Powell has been associated with H. P. M. in various executive capacities. For many years, he was Advertising Manager. Directly, or indirectly, during his 15 years, he has been closely associated with the company's line of plastics molding machinery and since 1949 has been Sales Manager of the H. P. M. Plastics Machinery Division. Prior to his association with H. P. M., he was for several years a member of the Sales Promotion Department of Briggs Mfg. Co. of Detroit, automobile body producers.

R. W. Powell

ABSTRACT:

Mr. Powell will describe and discuss the various phases in the development of H. P. M.'s new line of preplasticizing injection molding machines. Part of his presentation will be devoted to how the machines work, as well as what they can do. Samples of various parts molded on these new machines will be displayed. How pre-plasticizing will affect future machine design will be reviewed.

3:15-4:30—Session A

Presiding—Sherwood L. Young, C. F. Church Manufacturing Co.

PROFESSIONAL ACTIVITIES PANEL

Chairman of the panel is Mr. Sanford Glick, Monsanto Chemical Co.

"PLASTICS FOR THE AUTOMOTIVE INDUSTRY—TESTS AND APPLICATIONS"

By John K. Totten, Ford Motor Company.

"INJECTION MOLDING LUBRICANTS"

By A. R. Morse, Injection Molders Supply Company.

"QUALITY CONTROL"

By Dr. Larry M. Debing, Monsanto Chemical Co.

OTHER COMMITTEE REPORTS

By Jerome L. Formo, Minneapolis-Honeywell Manufacturing Co.

BIOGRAPHIES:

Sanford E. Glick graduated from Massachusetts Institute of Technology in 1941 with a B.S. degree in chemical engineering. He joined Monsanto and spent five years in the research department doing development work on styrene plastics, styrene copolymers and related materials. He was transferred to the technical service department in 1946. He served on the SPI wall tile committee and handbook committee. He has been chairman of the SPE sub-committee on injection molding techniques for the last few years.

Sanford E. Glick

Jerome L. Formo graduated from Augsburg College in 1937 with degrees in chemistry and education, then spent four years teaching high school sciences. He joined Minneapolis-Honeywell in 1941 as a chemist. He was transferred to the methods department where he worked with optical lenses and set up a lens cementing department. He was later asked to set up a plastics laboratory in the growing plastics division of the company. He is the National Director from the Upper Midwest Section of SPE and has been active in professional activities for several years.

Jerome L. Formo

John K. Totten has studied chemical engineering, chemistry and physics at Wayne University. In 1938 he went to work for Perry Laboratories in Detroit as a

chemist in materials and processes. In 1940 he became chemical engineer with the Ford Motor Company handling materials, tools and processes.

A. R. (Ren) Morse obtained his M.B.A. from the Harvard Graduate School of Business Administration in 1939. He served as field installation engineer for the Hartford Empire for three years and then joined Reed-Prentice Corp. as service and sales engineer. After almost ten years in their Cleveland office he organized his own company, Injection Molders Supply Company, which specializes in services to the injection molder.

PRIZE PAPERS.

The reading of the Prize Papers will follow these reports.

7:00—ANNUAL BANQUET.

Speaker is Major General Ward H. Maris, US Army.

BIOGRAPHY:

Major General Maris graduated from the University of Chicago in 1915 and was commissioned in the Regular Army in the Field Artillery two years later. He served in Europe in World War I. He later completed the Field Artillery School, the Command and General Staff School, and the Army War College, following which he was assigned as an instructor at the Command and General Staff School. In World War II, he served in Europe as Commanding General, XXI Corps Artillery. In 1946 he was assigned to the First Cavalry Division in Japan. He was appointed Asst. Chief of Staff for Operations of the Far East Command and Chief of the Strategic Plans and Operations Group, the Joint War Plans Group, of that command. He is at present serving as Deputy Assistant Chief of Staff, G-4, for Research and Development.

FRIDAY, JANUARY 18

9:15-10:30—SESSION A

Presiding—Carl F. Massopust, General American Transportation Corp.

"MOLD DESIGN"

Chairman of the panel is Mr. Massopust.

Panel members are: Wayne I. Pribble, Barrier-Pribble Co., Inc., Fort Wayne, Indiana; Victor G. Reiling, Kruz-Kasch, Inc., Dayton, Ohio; Edward F. Borro, Durez Plastics & Chemicals, N. Tonawanda, New York; W. P. Gobeille, Nash-Kelvinator, Milwaukee, Wisconsin; and, Wilfred G. Harvey, Guy Harvey & Sons, Leominster, Massachusetts.

BIOGRAPHIES:

Carl F. Massopust was graduated from Marquette University, Milwaukee, in 1942, with a B. Ch.E. degree. He worked for a time for RCA, Victor Division, as a manufacturing and development engineer, specializing in plastics products. He then joined the Electronics Processes Corp., where he did development work on plastics for packaging. In 1943, he entered Gregory Blessing Associates, as an associate consultant in materials and processes, specializing in plastics, doing consulting work for numerous firms. At present, he is superintendent of the Plastics Division of General American Transportation Corp., East Chicago, Indiana, in charge of all productive operations including the processing by various methods of all types of plastics.

Victor G. Reiling has a B.S. in Electrical Engineering from the University of Dayton (Ohio), and a M.S. degree in Physics from the University of Notre Dame. He was with the Dayton Rubber Mfg. Co. from 1934 until 1941 when he became associated with the M.I.T. Radiation Laboratory. He worked with the Dayton Acme Company of Cincinnati from 1943 until 1948, then, after a year with the Ace Electric Co., Bedford, Indiana, he assumed his present duties. He has done developmental work on "V" belts and mechanical rubber goods, and magnatron tubes. He was plant manager at Dayton, and Assistant Manager at Indiana, and has several positions involving the duties of chief engineer. He is at present Works Mgr. for Kurz-Kasch, Inc.

Wayne I. Pribble served his apprenticeship with the Fort Wayne Division of General Electric Company, and graduated as a toolmaker in 1937. He went to work in the Plastics Division at Fort Wayne Works where he designed practically all the molds made for that division between 1937 and 1941. In 1941, he became Product Engineer in the same Plastics Division, and in 1948, with Alvis L. Barrier, organized the consulting engineering firm of Barrier-Pribble & Co., Inc., to specialize in mold design and consultation on molding and methods.

W. I. Pribble

Edward F. Borro

Edward F. Borro, Service and Development Engineer of Durez Plastics and Chemicals, Inc., is a member of SPE, being affiliated with the Buffalo Chapter, and SPI. He is a pioneer in the plastics industry being identified with it in its early days.

9:15-10:30—Session B

Presiding—Warren F. Cooper, Tennessee Eastman Co.

"HIGH IMPACT STYRENES AND COPOLYMERS"

By Dr. Paul Elliott, Naugatuck Chemical Company, Div. of U. S. Rubber.

ABSTRACT:

Between the hard, rigid, but relatively brittle polystyrene molding compounds and the tough but relatively soft cellulosics there has been a gap. Many desired combinations of hardness, rigidity, toughness, heat resistance and/or chemical resistance could not be found in commercial molding compounds. The last three years have seen considerable advance in filling this gap. Certain copolymers of styrene have improved heat resistance and chemical resistance with moderate increase in impact; other modified styrenes show considerable improvement in impact at high hardness with some sacrifice of heat resistance. Further advance in this field has been found in the development of molding compounds produced by blending

of styrene copolymer resins with special rubbers. The resulting molding powders possess a combination of hardness, unusual toughness, heat stability, and chemical resistance which opens up wide, new fields for injection molded or extruded parts and shapes.

BIOGRAPHY:

Paul M. Elliott received his degree of Bachelor of Science in Chemical Engineering with highest distinction from the University of Maine in 1931 and the Ph.D. in Organic Chemistry from Cornell University in 1936. After one year at the du-Pont Experimental Station, Dr. Elliott joined the staff of the General Laboratories of the United States Rubber Co. at Passaic, New Jersey, and did research work on rubber chemicals. In 1939, he was transferred to the Naugatuck Chemical Division of this company and worked on rubber chemicals and rubber compounding, and the reclaiming of natural and synthetic rubbers. Since 1943, Dr. Elliott has been associated with plastics development at Naugatuck Chemical. For the past five years he has been Manager of Kralastic and Vibrin Evaluation, except for a short period during which he directed research work on government sponsored programs for the development of special adhesives and heat resistant laminating resins.

Paul M. Elliot

10:45-12:00

"NEW APPLICATION AND DESIGN OF PLASTICS"

Chairman of the panel is Mr. Jean O. Reinecke, Industrial Designer.

Panel members: Richard S. Burke, Mgr. Merchandise Testing and Devlopment Laboratories for Sears, Roebuck & Co.; Winfield Cooper, technical representative, Bakelite Co.; Jack Davis, Chief Engineer, Motorola, Inc.; Erik Furholmen, Furnel Inc., Consulting Engineers; James Johnston, Sales Manager, Chicago Molded Products Corp.; and T. F. Muckenfuss, Managing Buyer, Home Instrument Dept., Radio Corporation of America.

BIOGRAPHY:

Mr. Jean O. Reinecke has more than 15 years of industrial design experience, was art director of the Chicago Office of General Display Studios and while working here in the years 1933-34 he took part in many of the designs for displays at the famous Century of Progress Exposition. Because of his success there he formed an industrial design consulting firm with James Barnes, General Display Studio salesman, as partner. In this firm he served many nationally known firms including Chrysler, Bell & Howell, Montgomery-Ward, and Motorola. During World War II, his firm expanded and set up "task forces" to solve production bottlenecks. Later, Reinecke left this company and set up another for himself, J. O. Reinecke & Associates. In 1950 his client, Motorola, Inc., won the Fashion Academy Award for the excellent styling of its line.

Jean O. Reinecke

BIOGRAPHY:

Erik Furholmen has been actively associated with designing, tooling and manufacturing plastics for many years. He studied mechanical engineering at the University of Minnesota, and toolmaking at Dunwoody Institute. His toolmaking experience started with H. E. Wilcox Motor Co. of Minneapolis, and there he later became assistant to the superintendent. When Minneapolis - Honeywell Co. started their plastic molding department in the early 1930's, Mr. Furholmen was assigned to this department and has been associated with plastics ever since. He was with the Chicago Molded Plastics Corporation for several years and later was Works Manager and Chief Engineer with Cincinnati Advertising Products Co., as well as with Superior Plastics Co. At present he is president of Furnel, Inc., Chicago, specializing in "Product Development, Tooling and Production."

Erik Furholmen

During World War II he was an instructor at Northwestern University in Evanston, teaching evening classes in Plastics Fabrication and Production. He is also known for written and oral articles on various phases of plastics.

Thomas F. Muckenfuss, manager of the plastics division of the home instrument department of Radio Corporation of America, attended Drexel Institute of Technology in Philadelphia, Pa. He has been actively associated with the plastics industry for the past ten years.

T. F. Muckenfuss

ABSTRACT:

Each person will have five minutes for a prepared talk which will cover:

a. A brief outline of new applications of plastics of which the speaker has knowledge.
b. Suggestions for improvements of the plastics industry.
c. Those factors of the industry for which the speaker is seeking an improvement.

The remainder of the period will be devoted to discussion of the talks and answers to questions from the audience.

12:00—ANNUAL LUNCHEON.

Speaker will be Dr. G. F. D'Alelio, Koppers Co., Inc. Immediately following the annual luncheon, the annual meeting of SPE members will be held, and new national officers will be introduced.

BIOGRAPHY:

D. G. F. D'Alelio, Vice President and Manager of the Research Department of Koppers Company, Inc., received his Ph.D. from Johns Hopkins University in 1935. He was an instructor in the graduate school at Boston College, a staff chemist, and later, director of the plastics laboratories at General Electric Co., vice president and director of Research at Prophylactic Brush Co., and manager of the high polymer research laboratory in Industrial Rayon Corp. before he joined Koppers Company, Inc. He holds many patents in the field of high polymers.

2:00-3:15—Session A

Presiding—Edmund S. Childs, Monsanto Chemical Co.

"EXTRUSION OF VINYL FILM"

By A. M. Stover, Naugatuck Chemical Co.

BIOGRAPHY:

Mr. Stover received a Bachelor of Chemical Engineering Degree from Yale in 1940. He was with the B. F. Goodrich Co., of Akron, Ohio, until 1943. He was with the consulting firm of Foster D. Snell, as a group leader in charge of Rubber and Plastics, and left to join the Chemical Division of Glenn L. Martin Company in 1945. He was Director of Development for that division when it was absorbed by the Naugatuck Chemical Division of United States Rubber Company in December 1949. He then became Manager of Vinyl Development. He was awarded second prize in the Color Division of the first international "Photography of Science" competition sponsored by the American Association for the Advancement of Science. He was a charter member of the Board of Directors and Vice-President of the Baltimore-Washington Section of the Society of Plastics Engineers in 1948.

A. M. Stover

ABSTRACT:

Large volumes of polyvinyl chloride resins are now used to make film by calendering and casting methods. Consumption rose from approximately 18 million pounds in 1947 to about 80 million pounds in 1950.

Recently, new techniques have greatly accelerated interest in the manufacture of film by extrusion methods. The production of high strength thin-gauge films of excellent clarity and great widths now seems to be commercially feasible, promising the possibility of reaching hitherto untouched markets.

This paper reviews some of the problems encountered in developing compounds and techniques for the manufacture of blown film extrusions. "Blow Extrusion" consists essentially of extruding a small diameter heavy wall tubing and simultaneously expanding it with compressed air to a larger thin wall tube. For example, expansion in tube diameter from 4" to over 24" is possible with a final film thickness of one or two mils, or even less. This operation can be performed on a relatively small extruder with a 1½" diameter screw.

2:00-3:15—Session B

Presiding—Philip A. Belk, Hercules Powder Co.

"THE ROLE OF THE ENGINEER IN SALES"

By Edmund D. Kennedy, Monsanto Chemical Co., and Amos Ruddock of Dow Chemical Co.

BIOGRAPHY:

E. D. Kennedy

Mr. Kennedy received a B.A. degree from the University of Pittsburgh in 1933, and also studied at Carnegie Institute of Technology. His experience prior to joining Monsanto includes advertising and promotional work with Westinghouse Electric Corp., National Electrical Products Co., J. Walter Thompson, Vickers Hydraulic Co., and Kopperweld Steel Co. He is a member of the SPI Informative Labeling Committee, and the editor of "How to Label Plastic Products . . . For Profit."

3:30-3:15

"SYMPOSIUM ON MILITARY APPLICATIONS (RESEARCH)"

Presiding—Ken Gossett, Gossett & Hill Co., with representatives of government research laboratories as panel members.

Company Registrations

(Continued from Page 4)

THE SUNLITE MANUFACTURING COMPANY
1223 South 23rd Street, Milwaukee 46, Wisconsin
Representatives: Ralph E. Willis; E. Slingluff.

TAYLOR FIBRE COMPANY
Norristown, Pennsylvania
Representatives: E. N. Jacobs; B. R. Bryant.

TENNESSEE EASTMAN COMPANY, DIVISION OF EASTMAN KODAK COMPANY
Kingsport, Tennessee
Representatives: Warren F. Cooper; William L. Searles; John G. Slater; G. W. Carpenter; Eugene C. Cathcart; H. M. McDaniel.

WATERBURY COMPANIES, INC.
Waterbury, Connecticut
Representative: R. P. Magnenat.

VULCANIZED RUBBER & PLASTICS COMPANY
Morrisville, Pennsylvania
Representatives: C. P. Morgan; C. W. Virgin.

YARDLEY PLASTICS COMPANY
142 Parsons Avenue, Columbus, Ohio
Representatives: Charles E. Ebner; Robert W. Rosel.

Molding of Thermosets in *Sweden*

By INGEMAR SALEVID

Chicago Molded Products Corp.

In the early twenties the first molded phenolics were introduced in Sweden. It was probably German experiments which encouraged some foresighted Swedish industrialists to take up manufacturing of this plastic material. In some cases German specialists came over to Sweden to start plastics molding shops. Within a short time the Swedish workers grew plastics-minded and a great number of small plastic molders started out with former plastic workers as the owners. I think this fact is significant for the Swedish plastics industry, but I have also noticed that many American plastics molders have set out in a similar way.

During and after the war the plastics industry has made great progress especially in the U. S. The American plastics industry has abundant domestic sources of raw materials and also very great capital resources for investment in research and development work. The Swedish material manufacturers on the other hand are without many basic sources of raw materials, and all firms within the industry are comparatively small. The money available for research work is for that reason insufficient to keep up with progress in the U. S. and I imagine that the Swedish molders will remain dependent on American export of special grades and new formulations of materials and also new equipment and methods for plastics molding. Incidentally there are already several Swedish firms working on American licenses.

Materials

The only thermosets which are important in Sweden are phenolics, ureas, and melamines. The phenolics are dominating and general purpose materials as well as special grades are manufactured within the country. However a very high percentage of the production of molding materials is based on cresol resins with long curing time and impaired general properties as a result. Considerable quantities of molding materials are imported for applications where high quality and outstanding properties are required. The material for the coming Swedish manufacturing of TV-cabinets will probably be imported from the United States.

The domestic manufacture of ureas and melamines is of high quality and covers most of the demands. It should be mentioned that the manufacturing of melamines is on American license.

The production of phenolic laminates is rapidly increasing and decorative laminates with melamine or urea impregnated surface layers are very promising. Another relatively new product is molded laminated innerdoors for refrigerators manufactured on agreement with a great American laminator.

There are many new materials which are very important to the American plastics industry of today. The alkyds, polyesters and silicones to mention a few are invaluable for many applications but they are not yet widely used in Sweden as molding materials.

In this connection I should like to express my opinion that many more Swedish molders should be interested in American molding materials, if property charts could be given in accordance with Swedish testing standards, or if international standards could be established. I am sure that the progress being made by the Committee for International Standardization of Plastics will be of great benefit for the export of American molding materials to Europe.

Equipment and Machinery.

Most presses for thermosetting materials are of the compression molding type. There are still quite a few hand operated presses (screw, toggle, or crank presses) in use, but they are rapidly being replaced by hydraulic presses. A few transfer presses have been installed during recent years and a considerable number of compression presses have been rebuilt for transfer molding.

All larger plants have central hydraulic systems. In most cases, a low pressure system (50-500 psi) is used for closing the presses and a high pressure system (1000-4000 psi) for building up the needed pressure. The self-contained system which is widely used in the U. S. has not yet been introduced by any Swedish press-manufacturer. However, a few American built presses of self-contained type can be found in some larger plants. The valves are usually of simple design requiring manual operation but lately there have been made a few installations with automatically operated valves for semi-automatic molding.

There are two principal methods for heating molds—steam and electricity. I have noticed that in the U. S. that steam heating is most widely used while in Sweden electricity is preferred because of its simplicity of installation and its cleanliness in use. Steam heating is used in Sweden mostly for large molds and when a repeated heating-cooling cycle is needed. In order to be able to maintain a uniform temperature several other heating methods have been taken into consideration. Hot water and liquid heating are most promising. Induction and low voltage heating are two other methods which have certain important advantages. Neither of them is expected to replace the two conventional methods.

Preforms are used in many Swedish molding plants but not yet as extensively as in the modern American plants. Single stroke presses as well as rotary presses are used. Single stroke presses are used for larger preforms. Special attachments are available for preforming urea and melamine. Preforms of impact materials are made in hydraulic presses.

Electrically heated ovens are used for most preheating of preforms and powder. The electronic preheaters have been extensively used after the war but many Swedish molders have the opinion that they are too expensive (especially tube replacement and maintenance are high) except for a few applications. Infra-red preheaters are therefore growing in popularity at the expense of electronic preheaters. Steam preheating has not yet been recognized by the Swedish molders. The reason is probably that there are no good steam preheaters available on the Swedish market.

Molding.

There are many considerable differences in molding technique in the U. S. and Sweden. The most striking is probably that the Swedish press operators usually have 3 to 4 presses to attend, while the American practice is to have one operator for every press. This fact is a consequence of the wide use of slow curing materials and an attempt to eliminate the disadvantages of long press cycles. However, it is now being realized by many Swedish molders that these long press cycles are very obstructive to the development of the plastics industry, and the demand for more fast curing materials is increasing, even if they are considerably more expensive.

The handling of the material at the press is facilitated by preforming, but loose powder is extensively used for several reasons even when preforming presses are available. The main reason is that the use of preforms generally necessitates electronic preheating and this kind of preheating is often considered as too

(Continued on Page 12)

THE *Injection* MOLDERSCOPE

By A. R. Morse

President, Injection Molder's Supply Co.

Repair Parts

Over the years I have jotted down the prices of various repair parts, and I estimate that it would cost from 2.3 to 3.6 times the cost of a new machine to build up a machine from spare parts.

The injection molder often complains about repair parts costs. There is no denying parts are expensive, but do not forget the rate of change in our industry. Everytime a molder makes a suggestion for an improvement or change and gets it, it boosts his repair costs another notch.

Obsolescence, change, and relatively small lot production have all conspired to make injection machine parts manufacture a hand operation on a single set-up basis. Deliveries on a lot of parts are very extended running from 15 to as much as 30 weeks. Often the parts are not right when you finally do get them. You can't blame injection machinery makers too much as they just cannot possibly stock parts for all the various models they have ever made. The parts business is big in dollar volume, running from $50,000.00 in one concern to nearly a million in another, but I doubt very much if any machinery manufacturer is getting rich digging through old records and making up this or that pin or bushing from a long forgotten 1941 foundling or a 1939 bastard model of which only 2 or 3 were ever made.

What is more, no one else could possibly make a go of the parts business because of the lack of standardization even among the largest injection machinery people. On one popular make of injection machine alone I have seen as many as 6 different heating cylinders and or heating cylinder mountings all on one model of machine, all generally similar in overall appearance.

The repair parts problem in the injection industry is a tough one, and I do not think a reasonably priced answer will be found. This is just one more aspect of the injection business being driven forcibly home to some of the newer plants who still think getting a vital part that is shutting them down is just a matter of picking up the phone and ordering it. Even calling the president of the company—who is most likely in Florida this time of year—won't get a part when none is to be had. It is too bad that some type of priority or rating cannot be granted which will recognize how vital repair parts are in the injection industry so that materials can be quickly gotten to make them up.

Some molders have built up carefully selected inventories of vital parts at considerable investment—plants like Ideal Plastics, Nosco Plastics, Northwest Plastics or Franklin Plastics seldom if ever suffer serious lost time from breakdowns because they have on hand remarkably complete stocks of spare parts. Other plants which shall be nameless do not even have an extra nozzle. Now is a good time to call in your machinery representative and to plan on getting a minimum number of essential parts.

A Great Injection Molding Pioneer

When a 12 oz machine was still a rarity some 11-12 years ago, C. Jobst of Owens Brush Co. in Toledo designed and built a couple of C frame type injection machines which were years ahead of their times. The machines (2 are still in use) will not crush a cigaret held between the platens. A unique pneumatic safety opens the machine if any obstruction prevents die closing. Furthermore the injection pressure is automatically cut off when pressure inside the mold reaches a pre-set point, making it impossible to flash the press, and reducing parting lines to the minimum. (Some years later, Lester was to offer the same thing, and others have experimented with limit switches to shut off the injection pressure.) You can either mount the control microswitches inside or outside of the die. Jobst mounted them inside in back of a movable plug set in a runner, others have put them on the outside of the die so the slightest movement will operate them.

This feature is particularly interesting right now in view of the weighed feed and positive stroke plunger movement which is just beginning to get attention as it accomplishes the same thing, at least as far as the pressure exerted on the molded part is concerned. On present hydraulic, or hydraulic-mechanical clamp machines the micro-switch method of plunger shutoff is of dubious value because of the lag. The micro-switch operates a relay which operates a solenoid, which operates a four-way valve which eventually cuts off the injection pressure. But on Jobst's machines which are mechanical, the shutoff was immediate and positive, and he has for years enjoyed some of the benefits of **real** plunger control.

Jobst's machines are unique in other ways. Using the principle of the loaded ball, large diameter screws with a ring of pre-loaded balls running in the threads provide an almost frictionless opening and closing, and plunger action. Being 100% mechanical this type of machine would seem to hold real promise if it were further developed. Some of the early troubles (mostly with relays) which Jobst encountered can now be met with recent advances in steels and electronics. I mention this machine in sincere tribute to the designer, and also in the hope that he will again turn his attention to injection molding. The type of all-mechanical design might well prove an answer to the still rising costs of conventional hydraulic-mechanical construction. It is far less complicated—no pumps, no leaks, etc. And it is NOT a throw-back to the Isoma as some might think, as the mechanical feature operates almost without friction, and certainly without the breakage that used to plague the Isoma.

SWEDEN (from page 11)

expensive. When loose powder is used the operator has to weigh or measure up the required quantity. The charging of the mold is often simplified by the use of loading fixtures.

The curing time is determined by the thickness of the part, the preheating, the molding temperature, and the required quality. It is not necessary to cure the material completely when there are only moderate requirements on mechanical strength and dimensional stability. The wanted curing time is usually set on a clock, but it is occasionally simply determined by the number of presses the operator has to attend.

The molded parts are in most cases removed from the mold only by the use of an air blast. Several kinds of tools are also used for the removal, and ejector pins are included in the mold design only when the moldings are expected to stick seriously to one side. The molded parts are clamped in cooling fixtures when close tolerances are required.

I imagine that many material manufacturers in U. S. A. are looking for future markets for their materials even if the present situation is characterized by shortage of most materials. The European demand for plastic materials will in a few years be very great if the industry is successful in the competition with the die-casters, the glass and china ware manufacturers, etc. Especially Northern Europe should be observed as a great future market for plastic materials because there are no domestic sources of coal and other basic materials for manufacturing of molding materials. Sweden is the most industrialized country in Northern Europe and I know that several Am-

(Continued on Page 20)

Successful Designing for Plastics Molding

By W. M. HALLIDAY

Part two of this series of articles deals generally with the factors which must be taken into account in designing molds.

The development of a suitable and practicable design form for any plastics molded product entails taking cognizance of a very large number of important factors. These have, in the first instance, to be considered in a very logical manner in order that the best selection shall be made.

These factors have to be carefully chosen by the designer and intelligently adjudged as to their ultimate effects upon, and contribution to, the feasibility, quality and practical suitability of the finished molding. By judiciously balancing out these various factors it is possible to obtain a final design form which will give a product that is functionally sound, operationally reliable, durable in service, stable in form, satisfactory in appearance and finish and economical in cost. Some of these factors, which have to be considered in respect to any projected molded component design, will be purely mechanical in character; they will relate to the functioning, service-ability and use of the article.

Very briefly then, this first set of important design factors will be associated with the determination of weight, the various dimensions of the part, the character of the material, the strength of the component, or sections thereof, its thermal, or dielectric qualities, and so forth. The magnitude and influence of these mechanical factors will, of course, depend upon the nature of the service conditions the component will have to fulfill. A second set of design factors, which, unfortunately, are sometimes very inadequately considered and satisfied, will be associated with the aesthetic values of the component. Chiefly these will be concerned with the shape, form, finish, color blend, etc.

With plastics-molded components, unlike those articles wholly machined from metals, or which are roughcast in sand molds prior to final machining to size and shape, there will be a far greater number and variety of design factors to be contended with at the preliminary stages of the designing activity.

Preliminary stages is the point advisedly stressed, because very frequently one finds that the final form of a component design is not settled until the project is well under way. The author has repeatedly encountered instances where various important design features have not been satisfactorily determined until the mold manufacture has become well advanced, or even until it has been completed.

Action of this kind inevitably results in additional costs due to the resultant mold alterations, or, on the other hand, an unsatisfactory component in some respect or other. It may be found, for example, impracticable to introduce major variations in the design form when the project has become developed to these advanced stages. Compromises have, therefore, to be adopted which often fail to satisfy completely both the molder and the customer.

Therefore, to avoid such difficulties and many others which could be instanced, it is advisable to work out the component design form as fully and as thoroughly as possible *before* commencing the manufacture of the molding tools.

Design Factors May Be Complex

Many of the above-mentioned design factors, or rather, their successful elucidation, may be extremely complex. Especially is this the case with those factors connected with the physical properties of the materials to be employed and the nature of the service action they are capable of producing.

The successful selection and determination of these factors may depend greatly upon the degree of knowledge and understanding of the plastics materials and processes available. Usually such understanding bespeaks considerable technical and factual knowledge of materials, plus a wide practical experience in their use and manipulation by the various manufacturing processes now commonly used by plastics molding engineers.

In very many cases it is not sufficient for the designer merely to be acquainted with the knowledge that certain plastics materials possess particular and well-defined properties capable of meeting specific applications. Very often it is highly essential that the designer should understand how such materials behave when subjected to the particular forms of molding or fabricating methods to be followed when actual manufacture of the article is reached.

Each manufacturing process possesses certain limitations which often exert a considerable influence upon the shape, sizes, or dimensional variations of the finished component, and to that extent will therefore influence the design form which may be selected. In addition, the kind of manufacturing process selected will also condition the type of plastics material which can be used. Final costs of the finished article will be similarly influenced by the type of process selected for production.

Unfortunately, many purely engineering designers who are often called upon to evolve designs for a plastics molded component lack this practical experience. Hence there arises the necessity for close consultation with a reputable and experienced molding engineer, who will often be able to advise upon the best type of material, and process to be used, as well as suggesting useful ways in which the design form of the component may be adapted to meet the mold making or component manufacturing requirements.

Moreover, with many of the newer plastics materials now coming into wider practical use, knowledge of the full range of their mechanical and physical characteristics is only just becoming codified by the plastics technologists, and is relatively unknown beyond that small circle of specialists. In addition, the design problems are rendered still more complex by the fact that the number of available materials are now very large and diversified in character.

To exploit such a great range of materials to the best advantage, a correspondingly large number of different and in some cases highly specialized forming processes have been developed. Generally, these are of such an intricate nature that it is manifestly impossible for the ordinary engineering designer to have more than a nodding acquaintance with the requirements, possibilities, and limitations involved.

For example, there are several types of purely molding processes now in current use. Certain other methods of manufacture embrace a casting operation. Then there are a large number of what are termed the "fabricating" processes for the manipulation of sheet, tubular parts, rod, or strip materials. Each of these various processes involves a specialized technique for successfully and economically operating the special machinery, or appliances required.

These facts may explain in large measure why, in the past, so many plastics molded products have been found unsatisfactory either from the functional, service, or aesthetic standpoints.

Yet another cogent reason for such failures, which deserves very careful attention, is the tendency (all too current at one time) for the component designer to adopt design forms for plastics molded parts, which in essence were but copies, and even

in some cases exact duplicates of forms embodied in a component manufactured by a totally different process, and in a completely different material.

Designing Specifically for Plastics Molding

It is all too easy for the engineer designer to adopt such a course, particularly where an existing metallic or wooden component has to be superseded by a plastics one. He will be more apt to resort to such a practice if he lacks the understanding of plastics materials and knowledge of their manufacturing requirements. In this way, unsuitable features and shapes may easily be incorporated in the plastics molding. It is almost certain to incur difficulties for the mold maker and the plastics molder undertaking the production of the parts. It may also entail increased costs both in respect of the molding tools, and the finished articles.

Happily, in recent years engineer designers have acquired a wider appreciation of the dangers relating to such a practice, and there is today a greater understanding of the necessity to design specifically for plastics molding, if the fullest benefits are to be derived. This indeed constitutes one of the paramount essentials of all designing practice. Endeavours to initiate, reproduce, or copy design forms confined to a non-plastics article should, therefore, be rigorously abandoned at the outset, and every feature required in the finished molded component should be specially considered in the light of the plastics material to be employed, and the manufacturing process involved.

Later in this series numerous examples will be presented to illustrate the way in which difficulties of the above kind may be avoided, and more satisfactory design forms obtained, by specifically designing at every stage for plastics molding. By designing purely and exclusively for this method of manufacture, generally simpler mold designs and constructions may be possible, and consequently a more suitable product will eventuate.

Happily, the situation today concerning the properties and behavior of the many plastics materials both during molding or processing, and later when placed in service, is becoming very much clarified. Precise and very reliable practical information is being made freely available to those designers strictly outside the circle of specialist plastics technologists. There is, therefore, no valid excuse for an engineer designer when undertaking the development of a new design form, to remain unacquainted with all the requirements involved.

At the present time plastics materials have taken their legitimate place as constructional materials, which are capable of being considered and treated by engineer designers precisely in the same manner as other older constructional materials, i.e., iron, steel, wood and so forth.

Technical data covering every phase of the behaviour, physical properties, usage and composition of many plastics materials are obtainable. Moreover, much of this information is based upon long practical experience and prolonged testing under every conceivable service condition.

Due allowance has, of course, to be made during the initial design stages to cover the special physical or other qualities applicable to the plastics material to be employed. Such materials must not be expected to fulfill service needs for which they are manifestly unsuited by the limits of the properties possessed, or the manufacturing process involved.

Given such a logical treatment and intelligent relationship between design and materials, it is far more easily possible to obtain eminently satisfactory molded articles.

Choice of Available Materials

As already stated, an engineer designer when contemplating the use of plastics for a particular component has a very wide choice of materials available. In fact, this diversity of choice is perhaps one of the most striking differentiating features possessed by such a production method, in comparison with the more conventional and older engineering materials commonly used by the engineer.

Naturally, it will at once be appreciated that any particular plastics material may not possess all the properties which the designer desires to incorporate in his finished molded product. To make a wise and sound selection, it may become advisable to consult the plastics material manufacturer whilst the design form is still relatively undeveloped.

If precise details are given to such a manufacturer of the kind of service conditions to be withstood, the functions to be performed by the component, and the quality of the surface finish and color required, or any other unusual requirement, usually he will be able to advise on the appropriate type of material to be employed.

It is impossible to describe within the compass of this series of articles all the interesting physical and other properties possessed by the large number of plastics materials now extant and in very regular use. A short descriptive list can, however, be usefully appended here detailing the outstanding properties of the main groups of plastics materials, which no doubt will serve to guide the engineer designer when called upon to select a material for any given application. The brief outline now given in such a listing will also enable the designer to assess more reliably what kind of service performance he can reasonably anticipate from any material selected to meet a specific requirement.

Fundamental Grouping of Materials

As is well known, plastics materials are broadly divided into two basic groups: (1) thermo-setting, and (2) thermo-plastic. Whilst practically every plastics material comes within one or the other of these two fundamental groupings, there are numerous sub-types and grades within each group. In practice, this division results in a considerable diversity of materials and range of properties.

Briefly, the thermo-setting group of materials achieve their plasticity by the application of heat, but take on a permanent form or set, as far as shape and features are concerned, when further heat is applied. Thereafter they are unaffected by further heating, and their shape is thus irreversible and fixed. Very excessive heating at elevated temperatures will, in fact, cause a surface charring of these materials, but substantially their shape remains permanently set.

The thermo-plastic group of materials, when heated, soften into a plastic condition, and can then be molded to shape. They solidify when cooled to normal temperatures. Applications of further heat at repeated stages causes them to return to their plastic condition. Thus the shape is not permanent in the same sense as occurs with the thermo-setting materials. This is a most important distinction which has to be constantly borne in mind by the designer, because when he considers a component design he will have to ascertain whether or not the article, when placed in service, will be subject to heat. He must know, for example, whether a proposed thermo-plastic material which may be chosen is capable of resisting any service temperatures, so that the shape and dimensional features will be maintained. If he cannot be assured that such a material will resist effectively the working temperatures placed upon the component when in operation, he may have to select a thermo-setting type of plastics material.

(To be continued)

This is the second in a series of articles that is being reprinted from the British magazine "Plastics" by special permission of the author and the magazine.

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NEWARK—NEW YORK HOLD JOINT MEETING

By ANTHONY NATURALE

The Newark Section of the Society of Plastics Engineers was invited by the New York Section to attend their meeting in New York. The two chapters met at the Hotel Gotham in New York on November 14, 1951.

Mr. George Baron, President of the New York Section called the meeting to order and welcomed the members and guests of the Newark Section. We then heard from Mr. Pete Simmons, President of the Newark Section, who thanked the New York Section for their invitation and reminded the New York Section that they have a date with the Newark Section next January.

After the regular committee reports, the program chairman, Mr. Harold Schwartz was called upon to introduce the speaker of the evening. Mr. Schwartz introduced Mr. H. A. Meyrick, President, Industrial Mfg. Co. Mr. Meyrick spoke on "Mold Temperature Control-Injection Molding."

The topic proved to be a very interesting one which held the attention of everyone. It was finally called to a halt so that the boys from the Newark Section could get home in time for a few hours sleep before going to work the next day.

Mr. Meyrick stressed the importance of mold design with regards to proper cooling of molds. He pointed out that for best results the temperature of the water going into the mold should be almost the same as the temperature of the water coming out of the mold. Mr. Meyrick also pointed out that for best results the temperature of the water should be as close as possible to the desired temperature of the mold. As an example, he illustrated that if you wanted to hold the temperature of the mold at 120°F then the temperature of the water going into the mold should be 120°F and the temperature of the water coming out of the mold should be 120.5°F. Mr. Meyrick also pointed out that a mold so designed would give you the best results as it would maintain uniform temperature on the mold in addition to the other molding conditions such as heat on the material, time and pressure which can be set and remain fairly uniform.

The Newark program chairman Mr. W. Willert of Hartig Engine & Machine Co. Hillside, N. J. informed us that he has a super Christmas Party in store for us at the December meeting which will be held at our usual meeting place in Newark, the Military Park Hotel.

Mr. E. Rowan of Dillon & Beck, Hillside, N. J., who, as chairman of the SPE Speakers and Publication Advisory Committee, arranged to have Dr. Jesse H. Day, Editor of the Society of Plastics Engineers Journal, meet the members of the SPE Speakers and Publication Advisory Committee. The meeting was held in Mr. Joe Bonanno's office at Lionel Corporation and attended by Mr. Al Kaufman of Industrial Synthetics, Mr. Anthony Naturale of Naturale Tools, Inc., Mr. W. J. Dunnican of Synvar Corp., Wilmington, Del. and Dr. Jesse Day.

You can all rest assured that through the untiring efforts of Mr. E. Rowan and the cooperation of SPE members and Dr. Jesse Day, the Editor of the SPE Journal, (who spent a couple of days with Ed Rowan on his recent trip to Newark), the journal is going to be improved and become a leading publication in the plastic industry.

N.W. PENNSYLVANIA Notes and Personals

By PAUL C. ROCHE

Richard Heideman has just joined NOSCO plastics in the capacity of Process Engineer. Dick is well known to Erie molders and to the plastics industry as a result of his several years connection with Dow Chemical Co. in the Plastics Technical Service Department.

Karl Eckberg changed his connection recently and is now associated with Parker White Metal Co., a well established die casting firm of Erie, Pennsylvania, in the tool department. Karl has been employed previously in plastics injection molding die work at Acron Plastics Engineers, Inc. and NOSCO Plastics, both of Erie.

Harry H. Kugel, president NOSCO Plastics, has just returned from an extended trip which enables him to report on current conditions in points west, points in-between, and some points in Hawaii.

The Keller Machinery Div'n, Pratt and Whitney Div'n of United Aircraft Corp., provided the speaker for the November meeting of the Northwestern Pennsylvania Section, held at Pulakos-on-the-Lake, Erie. Presque Isle Plastics Inc., and Byrd Tool and Mold Co., both donated handsome door prizes.

Naturale Starts New Business

Mr. Anthony Naturale formerly of Thomas Mfg. Corp has left to become president of a newly former organization, Naturale Tools, Inc. located at 51 Morris Avenue, Newark, N. J. Within the next few weeks he will be joined by his brother, Mr. Joseph Naturale, who as vice president of Naturale Tools, Inc. will be in charge of manufacturing. The newly formed company will be doing plastic consultant work in addition to offering design and building services for tools, dies, molds, jigs and fixtures.

Doddridge-Peters & Assoc.

Stan Peters announces his resignation from Monsanto Chemical Company, Plastics Division, effective December 31, 1951. Mr. Peters will join Lee B. Doddridge as a partner in Doddridge-Peters & Associates with offices and warehouse at 1711 West 135th Street, Gardena, California. They will act as sales representatives for a number of manufacturers, handling industrial parts for the aircraft industry and the Los Angeles manufacturing market.

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PLASTICS IN IMPROVED WOOD AND A SYMPOSIUM ON INJECTION MOLDING ARE FEATURES AT WESTERN NEW ENGLAND

By WESLEY S. LARSON

The following is a summary of a talk given by Dr. Alfred J. Stamm of the U. S. Department of Agriculture, Forest Products Laboratory before the Western New England Chapter of the SPE, October 3, 1951, at the Sheraton Hotel, Springfield, Mass. Dr. Stamm first showed us a chart which is reproduced below illustrating the types of products made from wood and synthetic resins.

Products	Resin
Molded plastic (wood flour filler)	Phenolic, urea, furane.
Hydrolyzed wood plastics	Phenolic, aniline, furfural.
Linoleum	Vinyl, nitro-cellulose.
Wood laminates and assemblies	Phenolic, urea, resorcinol, melamine, polyvinyl acetate glues.
Wood to Metal Assemblies	Phenolic resin combined with polyvinyl butyral or rubber. Epon resins (epichlorhydrin plus bisphenol.)
Modified Woods	
Compreg	Phenolic
Arboneeld	Urea
Paper Base Laminates	
High Strength	Phenolic
Structural overlays	Phenolic
Decorative overlays	Melamine.
Dry form particle boards	Phenolic, urea
Wet strength paper	Urea, melamine.

Dr. Stamm delineated the divisions of operation of the Forest Products Laboratory. The three which use plastics are the Derived Products Section, the Pulp and Paper Section, and the Preservation (gluing) Section. Wood generally has 20 to 25% lignin with the remainder being cellulose and hemi-cellulose. A mild hydrolysis of wood frees the lignin and improves the flow. A severe hydrolysis tends to harden the lignin and decrease the flow. At 40% lignin content wood particles can be molded by themselves. However, added phenolic helps it to make a more moldable compound and more thermosetting. 25 parts of resin to 75 parts of wood is frequently used.

In making modified woods the objective is to lessen the shrinkage and swelling in water. Compreg has improved properties except its impact strength; the properties are mostly in proportion to the degree of compression. Compreg has good hardness, termite resistance, and electrical properties. In making Compreg, the wood becomes plasticized. The product is used for forming dies, knife handles, and picker sticks. Compreg can be molded by partially shaping the build-up but the difficulty is the high bulk factor of three. In molding a part such as a propeller blade, the hub is practically fully compressed before the mold even contacts the thinner blade. This tends to produce lines of weakness. A method known as expansion molding can be used to offset such difficulties. Dr. Stamm explained expansion molding as a method of compressing the wood striae with a thermoplastic resin. The object is formed and placed in a mold. Heating then releases the thermoplastic board and the build-up swells to contact the mold. The heating cycle then causes the thermosetting resin to cure and complete the mold. This type of molding can be used with paper, fabric, and asbestos also. Urea resin is not as good as phenolic and allows some spring back. Impreg was mentioned as being of few uses.

In paper-base laminates a very strong paper board was made but it did not have good impact strength. Structural overlay paper on plywood is used to mask defects and for protection as for concrete forms. Honeycomb paper cores are being used for sandwich panels. Chrysler uses a looped honeycomb; another shape is diamond shaped. 10% phenolic treatment will moistureproof a honeycomb core.

Wet boards must be made from fibers and do not rely on resin for their strength. The specific gravity ranges from .2 to 1.2. Masonite is an example. In general, the production is limited by lack of mill waste. Dry form granule boards attempt to utilize wood granules bonded with resin. A board having a specific gravity of .9 or more can be made with 5% phenolic resin at 1000 psi. The Curtis mill work board has 7% resin. The strength of wet board varies directly as the square of the specific gravity; the strength of dry board varies directly as the cube of specific gravity. The two are the same at a specific gravity of 1.3. With resin content as low as 7% the cost cannot now compete with Masonite. Urea for such a board requires $\frac{1}{3}$ more resin. The resin is cheaper, however, and gives a lighter color. Boards having lower specific gravity with larger particles require 15% resin.

In wet strength paper, the object is to get resin between the fibers and not in the fiber. Putting resin in the fiber would waste approximately 25% of it. The action is to reduce swelling and increase strength between fibers. Cellulose nitrate, cellulose actetate, cellulose mixed esters, and cellulose ethers were mentioned as products in which wood pulp or wood are used. Acetylated wood is made by replacing the hydroxl group with an acetyl group. The usual method of doing this would embrittle the wood but a method employing pyridine and acetic anhydride toughens the wood. Acetylated wood shrinks and swells only one-fifth as much as wood and less than phenolic treated wood. Another project which Dr. Stamm mentioned was using hard wood waste to make furfural. In response to questions, it was brought out that furfural mixture cannot be used for injection molding and that acetylation can be done only on the surface of large boards.

INJECTION SYMPOSIUM

The following notes summarize the meeting of the SPE Western New England Chapter November 7, 1951. The subject of the meeting was a symposium on injection molding. John Mallory of Parker Stamp Works acted as moderator and William Welch of Monsanto, Nels Taylor of Tenn. Eastman, and William Cronin of Hercules were on the guest panel.

Mr. Welch recounted that the main factors responsible for the tremendous growth of polystyrene were the low cost, low specific gravity, dimensional stability, electrical properties, and ability to be dry colored. The color has been improved since its introduction and also the flow. The material sets faster to allow shorter cycles. Another improvement has been the pelletizing allowing a lower bulk factor. High impact materials and chemical resistant grades have been introduced. The age stability of the molded parts is improved because of the lower monomer content. Larger machines and new uses such as bristles and sheets have required great quantities of polystyrene.

Mr. Taylor stated that acetate molds differently than styrene and in general is more viscous. Mold designs require larger runners and sprues. Small gates and short lands are pre-

ferable and round or square gates and runners are required. Cellulosics show good results with pin point gating and molded parts have less internal strain. Molding powder must be dried. The molding cycle is similar to polystyrene's and sometimes slightly longer. When both styrene and cellulosics may be run in the same mold, it should be designed for cellulosics and will then usually run in styrene.

Mr. Cronin mentioned that pin point gating was used 10 to 12 years ago. Cellulose acetate is troublesome because of blushing on the surface appearance. It is advisable to run the mold at 90 to 100°F and the cylinder as hot as possible (450°F) for best finish. Ethyl cellulose has the highest impact of common materials and also has excellent low temperature impact. It is used for telephone handsets and textile bobbins among other things. Its biggest handicap is the tendency of the material to striate. One reason for this is that it can be molded at 350°F when it should be molded at 450°F. The best molding is done 10 to 15°F below the temperature at which the material discolors or burns. Such striation is called "rubber." The mold should run at 140°F.

In response to questions, the following points were brought out. In designing molds for styrene and acetate, a design just for acetate is inadequate; for example styrene requires more draft and more knockout. The same mold will not necessarily run in 2 different machines and sometimes will not run in 2 machines of the same kind. A warm or hot die gives better impact for styrene parts than a cold die.

A yardstick mold 60 to 80 mils thick was found to fill better when cold than when hot and the parts were stronger. This experience was, however, contradicted in general by experiences in which molds fill better when hot. One mold was found to fill at ¼ the pressure at 275° than when run at 175°F. Properties were much improved in molds run at high temperatures and cooled; a prediction was ventured that cycling will be common practice.

Sink marks in cellulosics are best remedied by running a warm mold. Mr. Taylor said that a year or more ago he would have recommended "a cold mold and hold the plunger in" but they now find a warm mold is better. Butyrate tends to age on standing and fresh material molds softer. Weigh feeding was discussed and apparently gives better results when it can be used. The objective is to eliminate plunger pressure on the final fill which is a major cause of warpage. To eliminate striations and get well knit lines ethyl cellulose should be molded hot in a warm mold with a small gate which impinges on metal about ¼" inside the cavity.

MOLD TEMPERATURE CONTROL TOPIC LEADS TO OVER-TIME SESSION AT JOINT NEW YORK-NEWARK MEETING

By ARTHUR M. MERRILL

The New York Section was host to the Newark Section at a joint dinner meeting on November 14 at the Gotham Hotel. Some 120 members and guests of the two groups attended and heard H. A. Meyrick, president of Industrial Mfg. Co., speak on "Mold Temperature Control for Injection Molding."

The speaker noted that while control of mold temperature is accepted by the injection molders as a necessity, this temperature is not controlled as closely as are molding time and pressure. By graphically analyzing the temperature changes during the molding cycle, Mr. Meyrick showed how improper control of temperature can lengthen the cycle and appreciably affect production rates.

Temperatures are controlled on the basis of measurements made by pyrometers inserted in wells in the mold. Standard pyrometer temperature controllers actually show a range 15-20° around the preset limits, while proportioning type controllers narrow this differential down to about 8°. The speaker recommended the use of an input controller type controller system to provide temperatures within 3° of the preset limits.

Maximum water cooling and molding efficiency is obtained when the water leaving the mold is very close to the temperature of the mold surface in contact with the thermoplastic. Such efficient cooling requires that the water be in actual contact with the mold metal. While water cooling of the bolster plate beneath the mold can give uniform mold temperatures, the interface between the plate and mold acts as a resistance to heat flow and slows down the cooling rate. Under such an inefficient system, the exiting water is at a temperature 20 to 90° below that of the molding surface.

Emphasizing that uniformity of mold surface temperature is in itself no indication of water efficiency in heat removal, Mr. Meyrick urged the proper engineering of molds to provide for water passages in the mold itself.

The talk was received with great interest and followed by a very lively discussion period. In fact, it became necessary finally to stop the discussion short owing to the late hour, although a more informal discussion took place after the meeting ended officially.

New York Section president George Baron, Ideal Plastics Corp., presided over the meeting and welcomed the Newark members in the brief business session preceding the talk. Newark president Peter W. Simmons, Dow Chemical Co., acknowledged the welcome and expressed the belief that the cordial relations of the two groups, as exemplified by the semi-annual joint meetings, will continue in the future.

Mr. Baron also introduced the other New York and Newark Section officers, SPE national president Islyn Thomas, Thomas Mfg. Co., and visitors from other SPE sections and foreign countries who were present. Table favors were distributed through the courtesy of Harold H. Schwartz, Empire Brushes, Inc., and the meeting closed with a drawing for door prizes contributed by Celanese Corp. of America; Durite Division, Borden Co.; Monsanto Chemical Co.; and Stott Tool & Machine Co.

It was announced that the December 19 meeting of the New York Section will be the annual Christmas party: Saul Blitz, Noma Electric Co., is in charge of arrangements for the party, and asserts that it will be a memorable event in the group's history.

Two new members were added to the New York Section during November, as follows: John H. Lane, president, Solvents Reclaiming & Chemical Works, Inc.; and Henry N. Simons, president, American Vinyl Corp.

ST. LOUIS HEARS USES OF TENITE

By DAN OTTO

The St. Louis Chapter of the Society of Plastics Engineers held their regular meeting on Tuesday evening, November 27th at the Melbourne Hotel. They had as their speaker Mr. Lewis B. Connelly, St. Louis Sales Representative of the Tennessee-Eastman Co., Division of Eastman Kodak Co.

Mr. Connelly's subject was "The use of Tenite to Combat Corrosion in Oil Country" and he is certainly an authority on the subject.

We had a very nice turn-out for this meeting.

We are having our annual Christmas party on Tuesday, December 15th, at which time we will have election of officers.

Measurement and Control Are Formulas for Good Management--Connecticut

By DAVID MERSEY

The feature of the October meeting of the Connecticut Section was a panel discussion. The moderators were Charles Smith, Bryant Electric Co., Fred Sutro, Bakelite Corp., Rene Magnenat, Waterbury Companies. All the members were 'quiz kids' and did a good job of stumping the experts. Three of the 'quiz kids' came up with the same question, on restricted gating, so that the first prize of fifteen dollars was divided three ways. This was taken by Rene Magnenat and William Smith of the Waterbury Companies, and Joseph Wheeler of the A and W Tool Co. Edward Seim of Bryant Electric Co. was runner up with the next best question, "What phase of the plastics industry will make the greatest strides in the next five years?"

The November meeting took place on the ninth with a turn-out of 35. The speaker of the evening was Jack Schwab of the John L. Schwab Associates, Bridgeport, who talked on 'Methods Engineering in the Plastics Industry.' Mr. Schwab prefaced his talk by indicating that this is a new science, and plastics a new industry, so that both have a common basis of not being affected by too many preconceived ideas. However, in plastics there is a tendency toward overspecialization.

His formula for successful management is 'measurement and control'; control being the human element, and measurement the technical. The specifications for good measurements are:

1—They must be easy to understand by all concerned — both management and labor;

2—They must be easy to apply.

3—There must be absolute consistency.

4—The results must be reproducible.

When properly applied, measurements can predict, well in advance of actual production, what shall be a fair day's work. This permits proper and adequate training of personnel, and correct tool design for parts to be molded and assembled at a later date. It also permits a predetermination of production methods well in advance of actual production.

Mr. Schwab also gave a short demonstration of taking measurements of various motions, such as, hand and arm, and body and leg.

A rumor started to make the rounds that the meeting night be changed from Friday to one in the early part of the week; apparently Friday is a big bowling night in Bridgeport.

Miami Valley Meet Features Movies

By JOHN L. RUSSELL

Picture Nite was featured by Miami Valley Section, Society of Plastics Engineers, Inc. on Thursday, November 1. Showings of two films were made, "THE BELL HEARD 'ROUND THE WORLD," The National Cash Register Co. film, and "GRITS THAT GRIND," a Norton picture story on Tool Grinding. The meeting was opened with dinner at the Wishing Well, Centerville, O. Attendance of 41 included the following guests and prospective members — from Dimco Co., Dayton, Lloyd Gray, Robert Gray, Robert Duell, Robert Wright, and Charles Mueller; from Recto Molded Products, Inc., Cincinnati, O., V. L. Allen, Lloyd Larrick, Elbert Johnson, Gordon Hall, Robert Barton; from Kurz-Kasch, Inc., Dayton, Clarence Marsh and Ernest Mercs. Other guests were R. S. Cole, U. S. Rubber Co., who won the door prize; J. O. Ullman, DuPont Co.; Max H. Orlow, Diamond Tool Co., and Wm. Gerdes, Plastic Moldings Co., and Irvin Plausic, Recto Molded Products.

A gala Christmas party for members and their ladies Friday, December 7, at the Miami Valley Golf Club in Dayton; featured a dance, games, and a midnight dinner.

The Board of Directors have announced that candidates have been nominated for the office of Director with three to be selected by the membership.

Closed Mold Molding Techniques At Chicago

By TIM SERRELL

A capacity crowd of 122 were in attendance November 14, 1951, to hear Mr. Edward F. Borro's paper entitled, "Closed Mold Molding Techniques." Anyone wanting a copy of this paper may obtain one by request to Durez Plastics and Chemicals, Inc., North Tonawanda, New York.

With the advance registrations for companies running ahead of expectations and individual registration still to be taken, it was Mr. Lee Swift's belief that a shortage of rooms might exist at the Eighth Annual National SPE Technical Conference to be held at the Edgewater Beach Hotel, January 16, 17 and 18, 1952.

Mr. William Kosobud of the Detroit Mold Engineering Company was awarded the regional prize of $25 for his paper, "Air Gap Insulation in Plastic Molds."

Mr. Stan Peters of Monsanto Chemical Company, Vice-President and Director of the Chicago section of SPE, expects to leave the Chicago area for the West Coast to become a manufacturers representative.

The June Golf Outing is planned to be a three day stag affair at Nippersink, Wisconsin. The three day meeting is tentatively scheduled for Friday, Saturday and Sunday, June 20, 21 and 22, 1952.

Personals

George J. Pyshe has joined Sundberg-Ferar, 3157 Guardian Bldg., Detroit, Mich., industrial designers. Pyshe was formerly with General Motors and is a graduate of Pratt Institute, Brooklyn, N. Y.

William C. P. Zabel has been appointed operating head of Associated Plastic Companies, Suite 1195, Merchandise Mart, Chicago, as an executive vice president. He is president of Admiration Plastics Co., which will become a subsidiary of Associated. **Paul Young**, former manager of the Plastics Division of the Central Die Casting and Manufacturing Company, has been appointed general manager of Associated's Midland Plant, largest molding works of injection plastics of the group.

Daniel W. Kallman and **John T. O'Rourke** have been appointed Sales Engineers of the eastern division of the British-American Carbon Corporation, New York, N.Y. Both men will work out of New York.

Dr. James Paul Chittum, 39, died in early October in Waterbury,Conn.,following a long illness. Dr. Chittum, an authority on palyester resins and the styrene resin-nitrile rubber blend, had helped to introduce them to the industry as a technical sales representative for the Naugatuck chemical division of the United States Rubber Company.

Jack W. Askins, Dallas, Texas, has been named Deputy Director of the Materials Division in the Office of Civilian Requirements of the National Production Authority. Mr. Askins joined NPA in March, 1951, as assistant to the Director of the Construction Machinery Division. He formerly represented 12 New York manufacturing firms.

Mr. Louis R. Sereinsky, secretary-treasurer of the Indianapolis Section, died at his home on Friday, November 9. Mr.Sereinsky was president of the Success Plastics Recovery Works, Indianapolis, Indiana. He had been ill for some time.

J. Neuman, former plant manager of the Midland Die and Engraving Co., has organized a new firm, the Nu-Manufacturing Co., 1359 West North Ave., Chicago 22, Illinois. The new plant will make plastic molds and other necessary tools for the plastic industry. John Neuman and son Richard are partners in the company. The elder has been a member of the Central Ohio and Detroit Section for several years.

Dean M. Peebles, Seattle, Washington, is now a staff member of the Films and Flooring Division of the Goodyear Tire & Rubber Company. Mr. Peebles will provide field representatives with information of the development of Pliofilm, Vinylfilm, vinyl and rubber flooring materials.

Thomas R. Grimes has been appointed sales manager of U. S. Rovalite plastic products by the U. S. Rubber Company. Mr. Grimes has been sales manager of U. S. Chemical Sponge and Carpet Cushion since 1949. His headquarters will be at the Chicago plant, 2638 Pulaski Road. **William M. Coy** replaces Mr. Grimes as sales manager of U. S. Carpet Cushion and Chemical Sponge with headquarters at the Naugatuck, Connecticut, plant. He joined the company's general products division in 1939.

PLASTICS HORIZONS
CHICAGO JANUARY 16-18

PLASTICS BUYER ANSWERS DETROIT ON QUESTIONS OF CONSUMER SALES NEEDS

By WALTER KOSY

Chrysler Corp.

The November meeting of the Detroit Section of the SPE was held at the Rackham Memorial Bldg. with Carl Beier, divisional merchandising manager of the J. L. Hudson Co. as guest speaker. Mr. Beier has been with the J. L. Hudson Co., one of the nation's largest department stores, since graduation from the University of Michigan in 1929. Starting as an assistant buyer in the housewares department, he worked his way up to his present position, that of guiding the merchandising policies at Hudson's in their "hard goods" lines; appliances, furniture, kitchenware, hardware, toys, and the like.

In the 22 years he has been with Hudson's, Mr. Beier has been in the most excellent position to observe and appraise the growth of the plastics business. More than that he has actively assisted in promoting its growth. Technical plastics people are often prone to take credit for making the plastics industry what it is today forgetting that there wouldn't be any industry without the contributions that the merchandising men have made to it.

Mr. Beier's talk was entitled, "The Merchandising of Plastics." The subject matter was a departure from the usual technical talks held by the SPE but it was in response to an increasing pressure from the Detroit Section members for speakers who are experts in phases of plastics activity other than manufacturing and research.

To assist Mr. Beier in preparing his talk, the Detroit program committee prepared a series of questions pertaining directly to problems encountered by molders, fabricators, and other manufacturers of plastics goods in the merchandising of their products. The speaker answered these questions frankly and fully, drawing on his background in the promotion of plastics goods for many examples to illustrate his points.

The specific questions around which the talk was based were as follows:

1. How does Hudson's select the plastic items it will sell—why are certain ones preferred over others?

2. What is the future of plastics from the standpoint of the merchandiser?

3. Are plastic goods as readily acceptable as other materials?

4. What are the selling points and the drawbacks of plastics merchandise?

5. How do you think business will be for the next six months?

6. What can plastic manufacturers do to get more business in consumer's items?

7. What are a merchandiser's basic needs from a plastic manufacturer?

In the space we have allotted to report this meeting we cannot do justice to Mr. Beier's answers to these questions. In brief, however, his answers can be summarized as follows:

1. How does Hudson's select the plastic items it will sell? Why are certain ones preferred over others? Department store buyers know little and care less about how intricate a mold is or how an assembly problem was licked. They are not interested in what brand of material is used or other technical details about a product. They **do** know what products are available and their prices and also what the consumers' preferences are. The answer to the above questions is based on this knowledge.

Plastic items are selected on their ability to be resold to the consumer on the retail level. "Will it sell?", is criterion number one. Criterion number two is, "Will it perform?" Under current merchandising policies the responsibility of the store does not end when an item is wrapped and handed over. It extends over into the actual use of the article.

2. What is the future of plastics from the standpoint of the merchandiser? The answer is, "Very good, very promising." In looking back over the volume of plastics business done in the past 15 years, there is discernable a very definite trend. By projecting this trend one can predict a brilliant future for plastics and an expanding market.

3. Are plastics as readily acceptable as other materials? Yes, customers have become educated to the use of plastics and will buy almost any plastic item as readily as one made of other materials. Occasionally some doubts will arise, however, especially in marginal plastic applications. The plastic industry should redouble its efforts to make sure that items made of plastic will do the job expected of them.

4. What are the selling points and what are the drawbacks of plastics? This question was answered by a detailed analysis and many examples of various plastic items with which Mr. Beier has had experience.

5. How do you think business will be for the next six months? Mr. Beier's answer to this question was based on the vast amount of economic reports and services to which the J. L. Hudson Co. subscribes. He pointed out that if there is any one thing that a department store buyer pays most attention to, it is the condition of business in the next six months. Mr. Beier's opinion, in condensed form, was that for next six months business will be good, but that after that a softening up of business will occur.

6. and 7. What can plastic manufacturers do to get more business in consumer's items, and what are a merchandiser's basic needs from a plastics manufacturer? These questions are closely related and Mr. Beier lumped the two together in his answer. He said that the most serious problems the plastics people have to face are in connection with the marketing of their products. Improvements are needed in packaging, in labeling, and in consumer education.

Plastic products must be put up in better packages. They must be bright, have good color, good printing, good labels, good directions, and good designs and styling.

Labels and directions need improvement. Retailers carry that as an indictment against all industries but it applies particularly to the plastic industry. The trend in merchandising today is to self-service and an item must sell itself.

There must be more honesty in educating the public as to the limitations of plastics. There should be more rigid inspection of consumer goods to make sure that the products will perform. The large companies have done a fine job in educating the public but there is still considerable confusion about plastics due to the many trade names that are being promoted.

At the conclusion of his talk the usual question and answer period was held and then the members were invited to inspect an elaborate display of plastics merchandise, labeled to identify the good sellers and the reasons for their saleability.

We wish to thank the following individuals and organizations for helping to make this meeting a success:

Mr. Ben Grey, Toy Founders, Inc., for helping in securing the speaker and for the donation of door prizes.

Mr. John Slater, Tennessee Eastman Corp. for donation of door prizes.

Mr. Harry Haaxma, Wolverine Plastics Co., Milan, Mich., for the donation of many fine door prizes.

Mr. Erik Erikson, Detroit Plastic Products, for donation of table favors.

"PLASTICS HORIZONS"
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SPE CONFERENCE
The Edgewater Beach Hotel
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What's New?

DOMESTIC WAX

Concord Chemical Co., Moorestown, N.J., announce the development of a domestic wax that successfully replaces the imported Carnauba Wax at less than half the cost. Complete data sheet will be sent upon request.

TOLUOL IN BULK

Toluol in bulk and tank-car quantities is now in full production at Oil and Chemical Products Co., Inc., according to a company spokesman. The company has recently completed a large refinery and plant located at Galena Park in Houston, Texas. Information on grades and delivery schedules may be obtained from the company's sales offices: 295 Madison Ave., New York, N.Y., or City National Bank Bldg., Houston.

CUTTER

Small shops with no room for a large shear and bigger shops with too much work for their heavy shears will find Model 2024 or 1624 Metal Slitting Machine recently introduced by Wilder Manufacturing Co., Carmel Route, Monterey, Calif., reduces stand-by time, increases output, and cuts operating costs substantially. The machines handle up to 16 or 20 gauge mild steel—27 inch throat depth permits cut to the center of a four foot sheet of any length.

PLASTIC JOINER

North American Products Company, Milwaukee, announces a new flush-jointing tool for finishing operations on laminated plastic tops. The tool is carbide-tipped, facilitates portable routing operation, does a complete job in one sweep, and is designed to prevent injury to the materials. Write North American Products Company, 3100 West Cherry Street, Milwaukee.

KNIFE CUT

H. Maimin Co.'s Cyclon round knife cutting unit is now available in three speeds: 750, 350, and 275 RPMs. Two types of grinders, the No. 15 smoother edge sharpener or the gliding grinder are available on any of the units, which are supplied with 4, 5½, 6 or 7-inch blades, as desired. Contact H. Maimin Co., 575 8th Ave., New York, N. Y., for complete information.

WELD POLYTHENE

Completely welded Polyethylene tank liners of removable and stationary type are now offered by the American Agile Corp., Cleveland, Ohio. Liners of all sizes and shapes are fabricated to customer's specifications.

DREAM PIPE

Plastic pipe, developed by Yardley Plastics Co., Columbus, Ohio, has been used in Pax, West Virginia, in a new municipal water system. Some 25,000 feet of the pipe was used. The company, which spent two years in developing the product, says it will not rot, rust, or corrode, and is extremely flexible.

GREEN GLASS

The Snyder Manufacturing Co. of Philadelphia is now marketing extruded green Plexiglass winshield visor through accessory stores and mail-order houses. Models are made for almost all car models to shield the entire front seat. The plastic is made translucent by ribs molded into its upper surface.

INTERCOM

Talk-A-Phone Co., 1512 S. Pulaski Rd., Chicago, has introduced its new CL intercommunications system. In the low price range, the system permits incoming calls to be answered from as far as forty feet, and provides wide flexibility in calling, privately or non-privately. Its especially adaptable to systems requiring more than one master station.

GLASS IN LUCITE

The Creative Plastics Corp., Stony Brook, N. Y., and its affiliate, Time-It Corp., are using Lucite in two new types of devices recently announced. Level-It levels use hollow glass pieces molded in Lucite shapes. Another type puts the Lucite-glass combination in a Tenite II frame. The Time-It three-minute timer uses the same principle.

BRIGHT

A tiny new portable fluorescent lamp producing intense but cool illumination up to 450 foot candles is being offered by Stocker & Yale, Inc., through electrical wholesalers and specialty dealers. The lamps are rated at 7500 hours average life. Additional information may be obtained from F. P. Hayden, Sales Manager, Stocker & Yale, Inc., Marberhead, Mass.

SWEDEN

(Continued from Page 12)

erican material manufacturers already have considerable export to Sweden, but I am convinced that much higher export figures could be reached without too much effort.

The necessary remedies are more information about the materials and more service to the molders.

SPE Council Makes Technical Activities Area Responsibilities

At our October National Council Meeting held in Washington, D. C. it was decided that we would break down our Professional Activities into six areas.

Each Area is to have a Chairman and possibly a Co-Chairman in order to be able to handle a specific assignment in each area at least one assignment per year.

One of the reasons for doing this is that the Society has expanded so much that it is impossible that one Professional Activities Chairman to handle the entire Professional Activities Program.

The following areas decided upon were:

AREA I:
- Eastern New England
- Rhode Island & S. E. Mass.
- Western New England
- Connecticut

AREA II:
- Buffalo
- Toronto
- Rochester
- Northwestern Penn.
- Quebec

AREA III:
- New York
- Newark, N. J.
- Philadelphia
- Baltimore-Washington

AREA IV:
- Detroit
- Toledo, O.
- Cleveland
- Central Ohio
- Miami Valley

AREA V:
- Chicago
- Upper Midwest
- St. Louis
- Northern Indiana

AREA VI:
- North Texas
- South Texas
- New Orleans
- Southern California
- Golden Gate

We hope that by the January Council Meeting all the various Chairmen will be contacted and a definite program presented to them for the 1952 Season.

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